RAILROAD GAZETTE

FRIDAY, AUGUST 24, 1894.

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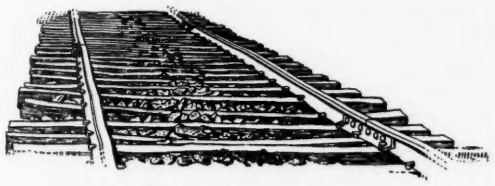
# Contributions.

## Effects of Driving Wheel Blows.

LEXINGTON, KY., August 4, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I attach some blueprints taken from a negative of the track beaten out of shape by a ten-wheel engine that had lost the filling out of the counterbalance of one of the rear drivers. The bends were very short, and in some of the worst cases were seven inches out of line. As in the case mentioned in your



Mile 70—Looking North.

paper, they were bent both in line and surface appearing for short distances only. The bends from this cause are distinguishable from any other. They appear at intervals so closely corresponding to the circumference of the wheel that the class of engines can be detected. In the trips this engine made the engineman recognized that there was a fault in the engine, but the only difference from the ordinary

Mile 70—Looking South.

"pound" was that it was harder and only occurred when running at high speeds. It was extremely difficult to locate until the bends of the rails determined the fault.

The track was an old, solid track, stone ballasted, with 72 lb. steel rails.

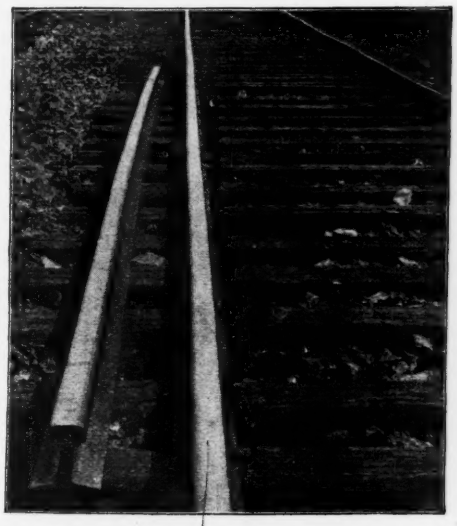
A. J. LOWE.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The enclosed photographs may interest many of the readers of the *Railroad Gazette*. They represent rails bent by improperly balanced engines running at high speeds. No. 1 shows a rail which was removed from the right hand side of the right hand track in the picture

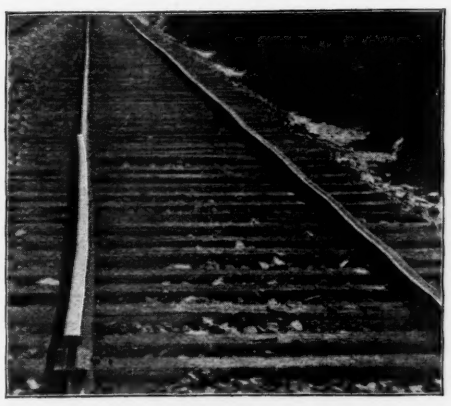
No. 4.

immediately opposite its present position. The gage side of the rail faces the left side of the picture. No. 2 shows the bent rail in the same position but from different points of observation. Nos. 3 and 4 show the same rail after it has been turned end for end and placed on the top of the adjoining rail. No. 5 shows another rail in the track with a vertical bend. The bend is just to the right of the hat which appears in the picture. This rail has in addition to the vertical bend, a horizontal inward bend which is not shown in this or any of the pictures.



No. 1.

The bent rail shown in Nos. 1, 2, 3 and 4 was made at one of the largest rail mills, in 1892, and weighs about 80 pounds per yard. The track at the point in question is ballasted with broken furnace slag and barring the bent rails is in pretty fair condition. A close examination of the track shows that on two different occasions the rails were bent. The removed rail shows two definite bends, one quite distinct, at a distance of 9 feet from the end and the other one, not so pronounced, at a distance of 8½ feet from the other end. The vertical downward bends are a little over one inch. In No. 1 both ends of the rail are 6⅞ inches from the rail in the main track. The same two series of bends continue for more than half a mile. The right hand rail in figures 1 and 3 shows some of these bends. The track shown in No. 5 has just been completely repaired except the rails, but no amount of



No. 3.

new ties, ballast, tamping or lining will take the bends out of the rail. These photographs do not illustrate the extreme in bent rails, as the writer has known of cases where the bends were more than ten times as great as those here shown, measured by ordinates.

HEADLIGHT.

## Views of a Conservative Trainman.

PHILADELPHIA, August 5, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The railroad manager aims to give prompt and safe service to the public and he is bound to give the public improved service even at the expense of the stockholders, if necessary, after every available invention has been adopted. Human ingenuity seems to have done its utmost; so, now, what is the next good thing that the manager can do for the benefit of the public, and the prosperity of his company? Treat his men in such a way that they will not strike. Meet them as equals, and discuss frankly and cordially the disputed issues. I hold that it is within the power of every general manager to do this. A board of arbitration, whether composed of disinterested members or not, or a contract between railroad men's organizations and railroad companies, is a curse. Why? Because, as a rule, the contracts are got up by men at the head of railroad men's organizations who are not in active railroad service. I believe in railroad organizations as a social and intellectual feature; there to end.

Let every tub stand on its own bottom. Let every man think and act for himself. Let every general manager or superintendent meet him as an equal, and discuss his complaint intelligently, or commend him for his good work. Make him feel that you are his friend; call all men, if possible, by their surnames; establish libraries and reading-rooms at all points where they can be used; they do not cost much. Make the men feel that you have an interest in them; do not let a man's nationality or religion prevent his promotion. Impress upon him the necessity of education for promotion. There should be a blending together of interests in all this, that would go far toward doing away with strikes.

C. D. L.

## Colombian Railroads.

BOGOTA, Colombia, July 20, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

To-day is the opening of two new railroads in this country, besides being the anniversary of Colombia's independence.

The first, and by far the most important, is the Cartagena & Magdalena Railroad, that connects the port of Cartagena with the village of Calamar, on the Magdalena River. The length of the road is 61 miles, and the construction is as good as any road can be in a tropical climate, and where it crosses large marshy swamps. To President Nuñez, of Colombia, and his secretary of "Fomento" (promotion), Dr. Goenaga, is due the credit of having caused the investment of American money in this enterprise, and the company which has furnished the money is composed of some of the best business men of Boston. To Mr. Francis R. Hart, of Boston, who put the

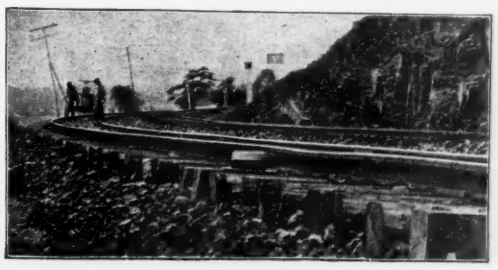
No. 2.

work on an honest working basis, is due great credit for diligence in the work of retrenchment. Mr. Butler, the chief engineer, too, should be mentioned.

The value of the road in question is that it connects by rail the best bay in South America with the Magdalena River. The mouth of this river is not navigable, owing to shifting sand bars. The examination which I have made of this river shows plainly that the most practical way of opening its mouth is by the construction of a canal from the Bay of Salger to the city of Barranquilla. This would cost from $1,250,000 to $2,000,000. Until this is done (and it will be many years before it will be) the Cartagena-Magdalena Railroad will be one of the best railroad investments in South America.

The other road which is dedicated to-day is the Northern Railroad, from the city of Bogota in the direction of Sipaquira, where the "salt mountain" is found which supplies salt to the most of Colombia. This road is 21 miles long and well built and equipped. It has been built by a local company, of which General Davila and General Roldau are the principal owners. It will be a paying enterprise, owing to the fertility of the country which it traverses. It is built on a plain 8,500 feet above the level of the sea, and contrary to what may be said of the Cartagena Railroad, it is located in a healthy climate, with a temperature equal to that of Virginia in the month of October.

It had been hoped that the Girardot Railroad, connecting Bogota with the Magdalena River, would be finished by this time, but as the concession has been held by



No. 5.

irresponsible parties, and as the promoters gave away all the stock, it is now impossible to find capital that will associate itself with all the law suits. My examination of the matter for the Pan-American Investment Company, of Washington, has revealed the fact that over two-thirds of the concession, etc., has been given away, and that the present concession is worthless. I believe that Congress will declare the franchise forfeited, and American

and English capital should be slow to go into the project without a new and distinct concession.

I consider the Girardot & Bogota franchise one of the best in the country or in any country, if it can be gotten direct from the national government, and I have myself offered to build the road if my company were given the concession direct, of course not ignoring the existing interests, which should be equitably considered.

C. F. Z. CARACRISTI, *Consulting Engineer.*

## A Blind Guide.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A few days since I had occasion to go to Peterborough, N. H. I therefore purchased a copy of the "Baby Pathfinder Railway Guide," vol. 9, No. 7; price 10 cents. On page 86 I found a time-table of the Peterborough & Hillsboro branch of the Concord Division of the Boston & Maine Railroad. Here it is:

| P. M. | A. M. | *Lv.* | *Ar.* | P. M. | P. M. |
|---|---|---|---|---|---|
| 1 15 | ..... | .....Boston..... | | 12 30 | 7 15 |
| 3 25 | 9 00 | .....Concord..... | | 10 05 | 5 03 |
| 3 57 | 9 35 | ....Contoocook.... | | 9 25 | 4 34 |
| 4 04 | 9 41 | ..W. Hopkinton.. | | 9 18 | 4 27 |
| 4 12 | 9 49 | ...Henniker Jc.... | | 9 09 | 4 19 |
| 4 16 | 9 54 | .....Henniker..... | | 9 07 | 4 16 |
| 4 40 | 10 17 | .....Hillsboro..... | | 8 48 | 3 58 |
| f | f | ....W. Deering.... | | f | f |
| 5 00 | 10 37 | .....Antrim ..... | | 8 15 | 3 40 |
| 5 10 | 10 43 | ....Bennington.... | | 8 10 | 3 36 |
| 5 50 | 11 12 | ...Hancock Jc. ... | | 8 05 | 3 30 |
| 6 05 | 11 27 | .....Peterboro..... | | 7 40 | 3 05 |
| 6 50 | 12 05 | .....Keene..... | | 7 00 | 2 40 |

Any one would naturally assume, as I did, that I could leave Keene at 2:40 p. m. and reach Peterborough at 3:05 p. m., in time to finish my business the same afternoon and get away early the next morning. As a matter of fact, I found Peterborough to be on a branch line from Hancock Junction; that the 3:05 of the time-table refers to a train which leaves Peterborough and runs to connect with the 2:40 train from Keene for passengers bound eastward, and that I had to wait at Hancock Junction until 5:50 p. m. and go to Peterborough by the train shown in the time-table as leaving Boston at 1:15, reaching there at 6:50 p. m.

In my opinion the printing of a time-table in this form is a piece of stupidity unworthy of an intelligent "baby." FRANKLIN L. POPE.

## Motors and Dynamos of the Gibbs Electric Company.

The growth of electric lighting and of the use of motors for power transmission is practically of the past ten years, and many of those who have contributed to this growth by the purchase of the earlier designs of electrical machinery have experienced considerable trouble arising from the lack of sound mechanical principles displayed in their construction. As long as the production of a current of electricity was thought to be the only important consideration in the design of a dynamo, the machine was a weak and complicated assemblage of parts, and a source of constant attention and expense to the user. During the past few years, however, engineers have begun to study the problem of the production of mechanically well designed, durable and cheap electrical machinery, and their efforts have resulted in an enormous multiplication of these machines in all parts of the country, and their extension to uses and locations formerly thought impracticable.

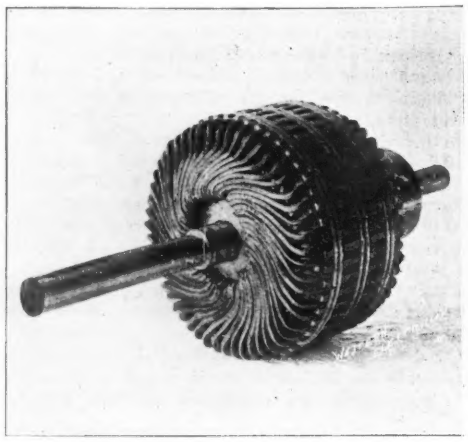


Fig. 2.—The Gibbs Armature.

These remarks apply especially to the transmission of power by electricity. This department of usefulness for electrical machinery is of more recent growth than that of lighting; but it is now looked upon as presenting, perhaps, greater possibilities than the latter.

The Gibbs Electric Company, of Milwaukee, Wis., has, by the co-operation of practical engineers and electricians, perfected a line of machines which combine in a high degree the qualities of mechanical excellence and electrical efficiency so desirable in isolated electric work. In a large plant considerable attention will be paid to the handling and running of the machinery, but in a shop where machines are driven by separate motors or where small dynamos for electric lighting purposes are driven from a line of shafting, the simplicity of a machine and its ability to do efficient work without expert attention, are strong points in its favor.

By reason of the intermittent character of the work, electric motors are especially adapted to use on transfer tables, turn-tables, traveling cranes, hoisting machinery and elevators, portable machines for running flexible drills for staybolt and other work, cylinder boring in place and valve seat facing, portable pressure pumps for boiler testing, exhaust and pressure fans for blacksmith shop work or shop ventilating or heating, and also for running small isolated shop plants which are removed some distance from the main power plant.

Fig. 1 shows a view of the Gibbs motor complete. The design of frame is one adopted as standard for the regular type of dynamo and motor for sizes up to 10 h. p. and is practically of the same design as the 50 h. p. machine. The claims made for this construction of frame are mechanical simplicity, compactness, strength and high electrical efficiency due to an unbroken magnetic circuit. The overhanging arms not only afford a simple method of securing the journals in absolute alignment, but afford an efficient protection to the working parts of the machine from accidental injury. The operation of taking out the armature is readily effected by removing four bolts which secure the back yoke. This constitutes the only portion of the machine to which access is required in event of turning off a worn commutator.

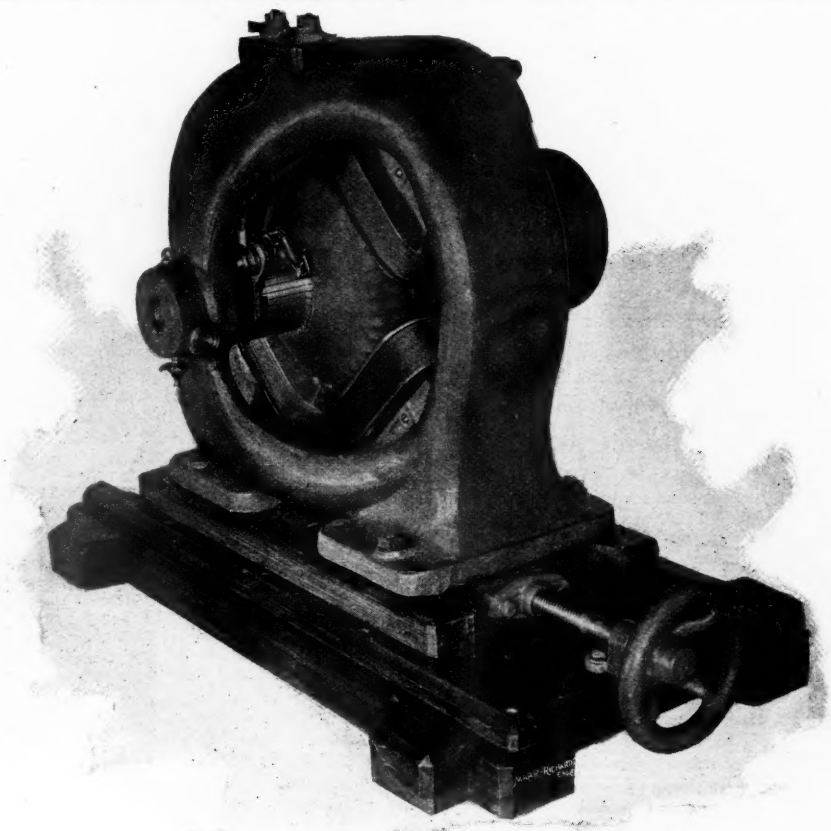


Fig. 1.—The Gibbs Slow Speed Motor.

The journals are carried in a novel form of "false shell," which at the same time forms a reservoir for holding lubricating oil. The oil is fed continuously on top of the journal, by means of light brass rings which bear on the same and dip into the oil. This device dispenses with the necessity of oil cups, and the lubrication needs absolutely no attention for periods of two to three weeks running. This same shell carries the brush-holder lugs, thus fixing the brushes in the proper position on the commutator without any possibility of their becoming displaced. The brushes require no shifting under any variation of load, a feature which will be readily appreciated by users of electrical machinery, and one which is unique with these machines. The machine is mounted on a substantial sliding base frame, and provided with a convenient means for tightening the belt.

In order to overcome the defects due to the complicated winding and small diameter of the armature generally used, this company has adopted a form of armature, consisting of a drum of large diameter having slots in its surface to hold each wire firmly in place. The winding is formed of coils, separately placed on the core in a finished condition. The winding of these armatures is a special feature of these machines. Each coil is wound on a former of the exact shape of the finished coil, and all are necessarily of the same length, weight and resistance, thus insuring an armature in strict mechanical and electrical balance. To this construction may also be partly attributed the freedom from sparking which these machines exhibit. The coils, being wound separately, may be easily replaced in a short time and at a small expense. It will be noticed by reference to Fig. 2, that the armature is very symmetrical in appearance, while its iron clad surface effectually protects the winding from injury, and allows running with a minimum of clearance between the pole pieces and armature, thus largely decreasing the "weight output" of the machine.

The simple construction of the machine has enabled the company to offer a slow speed machine at a price actually lower than is asked for a high speed one often of inferior design and finish. The advantages of slow speed in direct attachment to machine tools, or in belting to a counter-shaft, will at once be apparent to mechanical men.

## The New Union Station at St. Louis.

The new Union Station at St. Louis, for which the claim is made that it is the largest passenger station in the world, will be opened for business on September 1. The head-house of this station is not as large as some others, nor does the station proper cover as much ground as the station and separate buildings of the station at Frankfort-on-the-Main, but in track facilities, the claim that the new Union Station at St. Louis is the largest seems reasonable. The Broad Street Station at Philadelphia accommodates a greater number of trains in twenty-four hours than the St. Louis Station is called upon to provide for. But a large station is necessary at St. Louis because all the roads send out their through trains between 6 and 8 a. m. and 6 and 8 p. m. The demand at these times is heavy, while at other hours it is very light.

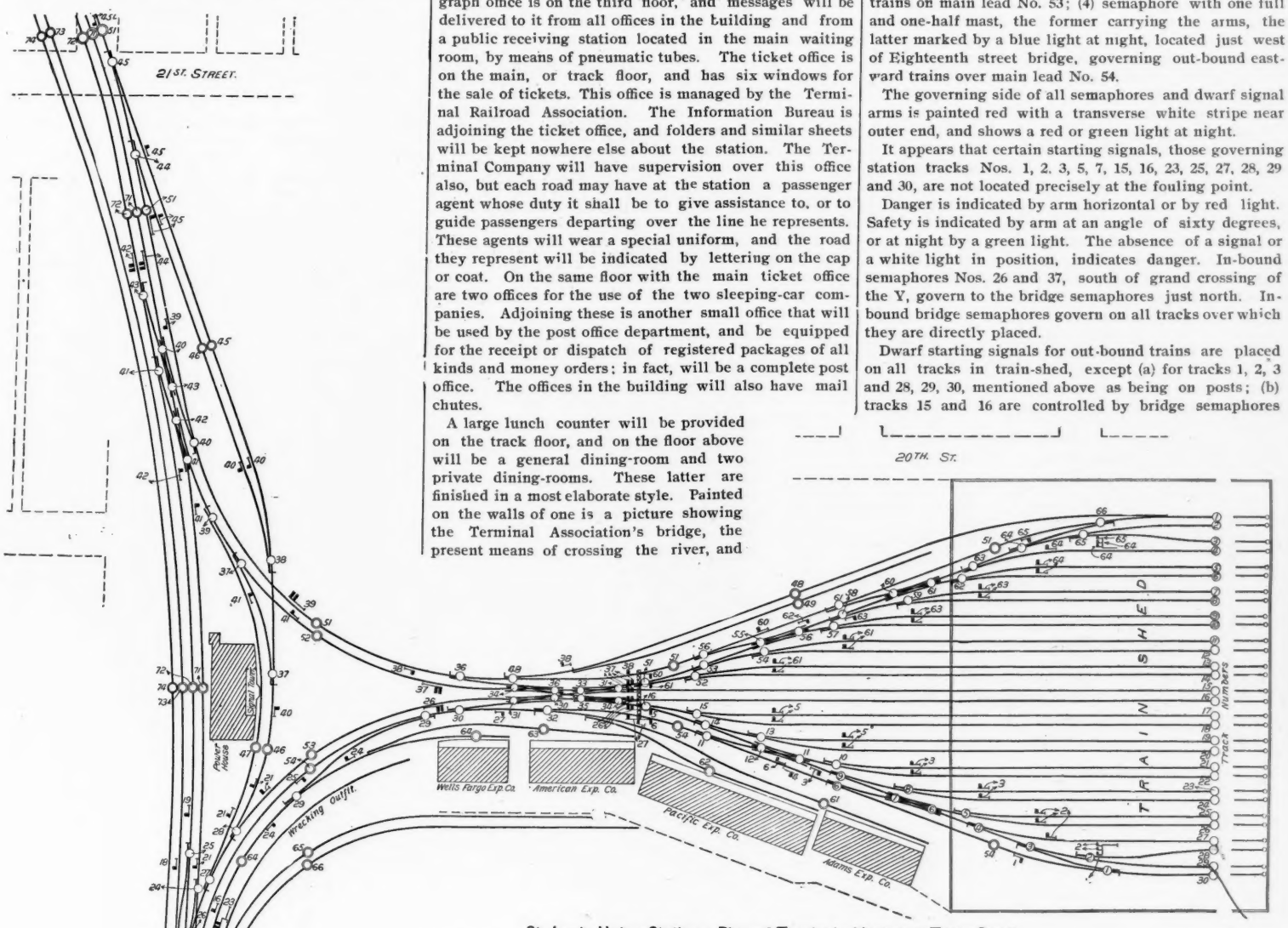
The proposed plan of tracks and a description of the station were given in the *Railroad Gazette*, July 24, 1891, and as there have been but few and unimportant changes made since then, only the final track arrangement and an outline of train shed are illustrated now. In a future number we hope to give engravings from photographs showing the finished appearance from different points of view.

The main tracks of the Terminal Railroad Association at this point run from east to west, and appear at the left of our diagram, the top of the page being west and the bottom east. It will be observed that the power station for the pneumatic switch and signal apparatus and for electric lights, the second story of which is the interlocking tower, is located on the north side of the main line. This building is in the opening of a double track Y, the four tracks giving communication between the main-line tracks and the tracks in the train-shed. There are at present thirty tracks in the train-shed, and space at the Eighteenth street side for two more; these two will be put in as soon as business demands them. It will probably be found necessary to reserve the track that is adjacent to the baggage house, for the receipt and dispatch of baggage cars. The tracks are arranged in pairs with platforms between each two pairs. The platforms are of wood, and seem out of keeping with the other parts of the structure; the pits of a brewery, which once stood on the site of the new station, occupied the space enclosed in the train-shed, and until these pits are compactly filled and settling has ceased it is deemed best to use the temporary plank platforms. The head-house ends of the tracks are provided with Ellis stops. South of the train shed, and between Eighteenth street and the tracks, are located the separate buildings of the four express companies, the Adams and the Pacific have each separate tracks, and one track serves the Wells-Fargo and the American companies. The milk tracks, two in number, are at the west side of the terminal tracks, and one narrow platform serves for the delivery of milk cans. Inbound through trains, either east or westbound, will run through the south leg of the Y, and set back into the

station so as to be headed properly for departure. The track diagram shown with this shows each track by a single heavy line.

The interlocking apparatus was put in by the Union Switch & Signal Company.

The power station has two batteries of Babcock & Wilcox boilers fitted with mechanical stokers furnished by the same company. The engines are of the Buckeye make, are tandem compound, and the generators were furnished by the Seimens & Halske Company of America. The entire station and auxiliary buildings will be lighted by incandescent and arc lamps, the current for which will be supplied from the central power station and the heating of the buildings will be done, so




St. Louis Union Station.—Plan of Tracks in Yard and Train Shed.

far as possible, by the exhaust steam from the enignes; if more steam than what passes through the engine cylinders is required, it will be supplied from the boilers direct, at reduced pressure. The water of condensation from the heating pipes is returned to the boilers. The steam and return pipes and electric leads are laid in a central conduit extending from the power-station to the head-house. The plan of the power-station has received as much attention and care, comparatively, as the main station, and is considered a most excellent plan, Mr. H. P. Taussig, the chief engineer, having been much complimented on the arrangement.

The train shed extends from 50 feet south of the head-house to the centre of Clark avenue, the south end of the shed being on a line with the south end of the mail-house. It is 600 feet long, to which length should properly be added 50 feet occupied by the transverse platform between the head-house and the tracks; this passage is called the "Midway," and is also covered by a roof. The train-shed roof, of which about one-fifth is glass, has a surface equal to about ten acres. It is a single flat arch with four rows of intermediate supports. The baggage-house and mail-house, each two stories high, are covered by the train-shed roof. The width of the train-shed, including the baggage-house, is 606 feet. The mail-house will be used for storage of through mails in transit, and also as a sub-station of the city post office. Conductors will register in a part of a small building that is located between the "Midway" and the ends of the tracks, and about equi-distant from either side of the train-shed.

Exit from the train-shed to the streets is provided at both ends of the "Midway" to Eighteenth and Twentieth streets, and at many places through the head-house to Market street.

The offices of the Terminal Railroad Association are in the second and third floors at the east end of the head-house; the remaining office room will be let. The telegraph office is on the third floor, and messages will be delivered to it from all offices in the building and from a public receiving station located in the main waiting room, by means of pneumatic tubes. The ticket office is on the main, or track floor, and has six windows for the sale of tickets. This office is managed by the Terminal Railroad Association. The Information Bureau is adjoining the ticket office, and folders and similar sheets will be kept nowhere else about the station. The Terminal Company will have supervision over this office also, but each road may have at the station a passenger agent whose duty it shall be to give assistance to, or to guide passengers departing over the line he represents. These agents will wear a special uniform, and the road they represent will be indicated by lettering on the cap or coat. On the same floor with the main ticket office are two offices for the use of the two sleeping-car companies. Adjoining these is another small office that will be used by the post office department, and be equipped for the receipt or dispatch of registered packages of all kinds and money orders; in fact, will be a complete post office. The offices in the building will also have mail chutes.

A large lunch counter will be provided on the track floor, and on the floor above will be a general dining-room and two private dining-rooms. These latter are finished in a most elaborate style. Painted on the walls of one is a picture showing the Terminal Association's bridge, the present means of crossing the river, and a ferry boat just leaving one shore, the old transportation line. At the opposite end of the building, on the track floor, is the emigrants' waiting room, and this also is provided with a lunch counter. The head-house does not extend the entire distance from Eighteenth to Twentieth streets. The head-house is 456 feet long, facing Market street, and the train-shed is 606 feet wide, leaving at Market and Twentieth streets a corner 150x80 feet not occupied by the station. On this corner the Terminal Association is now erecting a hotel, the exterior appearance and interior arrangements of which will conform to the appearance and arrangement of the station The hotel will have ninety rooms.

A barber shop with baths, for men, is provided, and there is also a bathroom in the ladies' toilet. This is somewhat of an experiment. Another new idea, is a room for the use of babies and their nurses; this room is separated by a screen from the ladies' private waiting room.

With the exception of the Missouri Pacific cars, the Terminal Association will handle all cars running into the Union Station much as if they belonged to the Association, and will do the cleaning and light repairs, but charge the same to each road. The company will also do light repairs on the passenger engines belonging to some of the roads. The cleaning, repairing and storage tracks for passenger cars will be out about two miles west of the station. The Association now has a small locomotive repair shop at Poplar and Sixteenth streets, but this is rather deficient in many respects, and new shops, to be built this fall, will be located convenient to the car-cleaning and repairing tracks.

The new station will be opened for business at midnight, September 1, and the railroads, express companies, and all concerned, are prepairing for a grand parade from the old to the new station. The Mayor of the city will open the ceremonies with an address, and the reply will be made by some prominent railroad officer, probably Mr. M. E. Ingalls.

TRACKS AND SIGNALS.

The train-shed tracks are numbered from west to east: No. 1 alongside the baggage-room, and No. 30 next to 18th street. The four main leads are: West out-bound, No. 51; east in-bound, No. 52; west in-bound, No. 53; east out-bound, No. 54. The west milk track is No. 48, and the east, 49. The express tracks are numbered as follows: Adams, 61; Pacific, 62; American, 63; Wells-Fargo, 64.

All signals are directly over head, or to the right, with arms pointing to the right in running direction of track governed, except (1) dwarf signals for tracks 1, 2 and 3 located together on a post just east of track No. 3; (2) dwarf signals for tracks 28, 29 and 30 located together on a post just west of track No. 28; (3) two-arm semaphore to the west of main lead No. 53 governing in-bound trains on main lead No. 53; (4) semaphore with one full and one-half mast, the former carrying the arms, the latter marked by a blue light at night, located just west of Eighteenth street bridge, governing out-bound eastward trains over main lead No. 54.

The governing side of all semaphores and dwarf signal arms is painted red with a transverse white stripe near outer end, and shows a red or green light at night.

It appears that certain starting signals, those governing station tracks Nos. 1, 2. 3, 5, 7, 15, 16, 23, 25, 27, 28, 29 and 30, are not located precisely at the fouling point.

Danger is indicated by arm horizontal or by red light. Safety is indicated by arm at an angle of sixty degrees, or at night by a green light. The absence of a signal or a white light in position, indicates danger. In-bound semaphores Nos. 26 and 37, south of grand crossing of the Y, govern to the bridge semaphores just north. In-bound bridge semaphores govern on all tracks over which they are directly placed.

Dwarf starting signals for out-bound trains are placed on all tracks in train-shed, except (a) for tracks 1, 2, 3 and 28, 29, 30, mentioned above as being on posts; (b) tracks 15 and 16 are controlled by bridge semaphores directly over those tracks.

The regular route of in-bound trains from the east will be over track No. 72 through cross-over to track No. 71, the rear of train clearing semaphore No. 44 west of power-house. The regular route of in-bound trains from the West will be over track No. 72 to cross-over just east of power-house to track No. 73, the rear of train clearing signal 18 east of Eighteenth street bridge.

The regular route of out-bound trains to the west will be over main lead No. 51. The regular route of out-bound trains to the east will be over main lead No. 54.

Where a mast carries two arms, the upper arm designates the regular route; the lower arm designates all other routes.

Train starter's annunciator push-buttons are located on the platform side of all tracks, and also on starting dwarf signals. Out-bound train conductors will plunge these, indicating "train ready," one minute before leavin time.

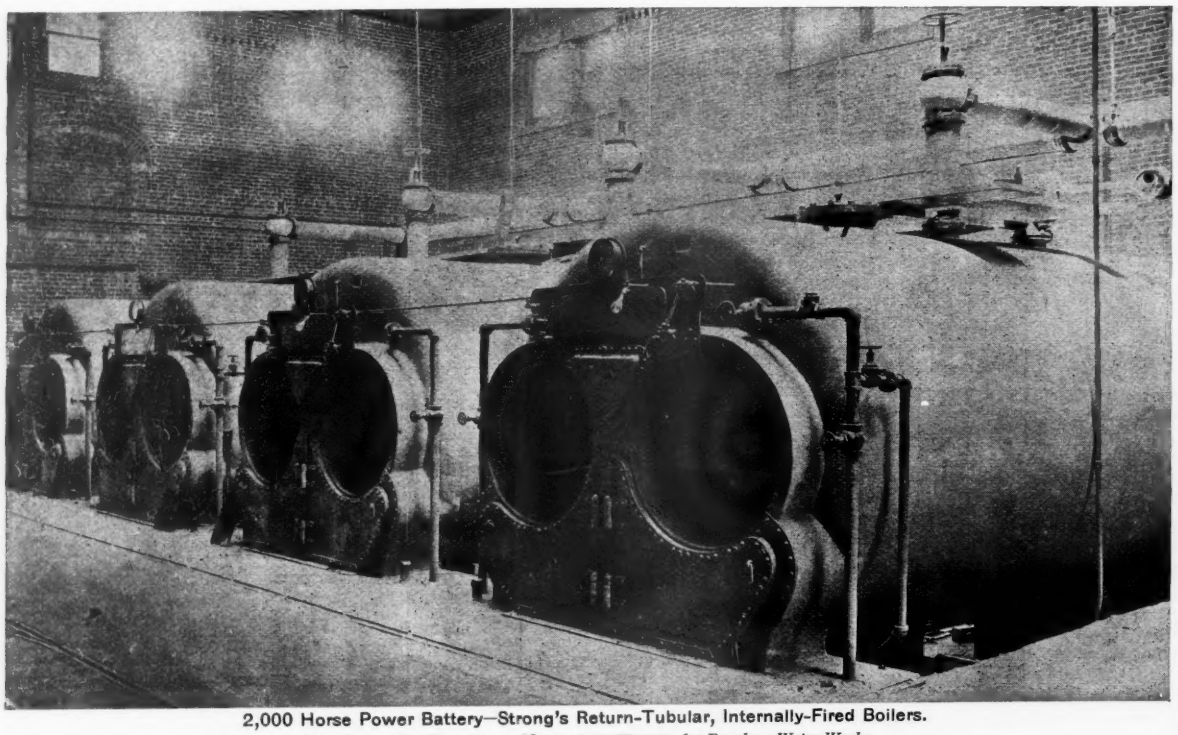
## Strong's Internally-Fired, Return Tubular Boilers.

The boiler plant shown in the accompanying illustration was designed to meet what was considered to be a high duty or guaranteed requirement, i. e., 10 pounds of water per pound of anthracite coal from a temperature of 212 deg., to dry steam of 110 lbs. above atmospheric pressure, each boiler to have a capacity of 6,000 lbs. of water per hour, and to be capable of evaporating 10,000 pounds of water under forced draught, without loss of efficiency or making wet steam, or without priming. Other builders had refused the contract with this guarantee, as this result had not been found possible with other boilers on continued tests with similar coal. The designer of these boilers having had considerable experience with high rates of evaporation on locomotive types of boilers and internally-fired boilers, considered that the largest per cent. of the steam (80 per cent.) would be generated around the furnaces, and that to prevent priming when the boilers are forced, this 80 per cent. of

the steam should not be forced through the tube chamber around the tubes, as by so doing it would carry the water that should remain solid and in contact with the tubes away from the tubes and cause priming. So it was deemed best to locate the furnaces near the water line and place the tubes below the furnaces, thus allowing the steam thrown off by the furnaces to pass at once to the water line while hot and partially superheated. The gases pass from the ends of the furnaces, which are 18 feet long, into a brick-lined chamber at the back of the boilers, which chamber is part of the shell and entirely air tight, so that no leakage of air can occur. This back, or combustion chamber, is provided at the bottom with a hopper with a slide, to receive any ashes that would otherwise be drawn into the tubes. The gases drop from the end of the furnaces into the tubes, through which they return to the front and drop into an underground flue or tunnel, which leads to the stack located outside of the boiler-house. There is a damper on the downtake of each boiler, and a large one in the main flue just inside the wall of the boiler room, which latter damper is controlled by an automatic regulator.

The boilers are supported on a pier at the front, where they are built into the flue, and at the back are carried on a rocker with a safety pier, allowing them to contract and expand without breaking loose at the place where the flue connection is made, and no leakage of air into the flue can take place.

The boilers are covered with three inches of asbestos cement, 1" air space, so that very little heat is radiated and the boiler room is comfortably cool in warm weather,



2,000 Horse Power Battery—Strong's Return-Tubular, Internally-Fired Boilers.
*Manufactured by* THE EDGE MOOR IRON WORKS *for Brooklyn Water Works.*

while in winter, with no other means of heating, a man would find it necessary to go fully clothed or to work to keep warm; thus the large loss of heat usual to brick-set boilers is avoided. All the radiation of the heat of the fire here, having to take place through the water, the radiation is only that of the temperature of the water or steam, which at the pressure of 110 lbs. is 343.9 deg., while the temperature of the furnace would be 2,000 to 2,500 degrees, so that the difference in radiation can be readily appreciated. And as this high temperature has a bad effect on the setting of brick-set boilers, causing the brickwork to crack and become full of holes, through which the air passes direct to the stack or through the tubes, cooling down the boiler and gases, a large waste of heat must result. That this loss does not take place on a boiler of the internally-fired type as here shown, has much to do with the very high efficiency.

Circulating plates are arranged on either side, reaching from a point near the water line to a point near the bottom of the boiler, so that the water gets back to the bottom of the boiler without obstruction. The water then starts up through the tube chamber around the tubes, and then around and between the furnaces, which being the hottest, generate the most steam, and then it is thrown off at the water line, and as only 20 per cent. of the evaporation is done around the tubes, no priming or lifting of the water can take place. As there is a very large amount of direct heating surface, the boiler is capable of giving a great capacity for a given number of square feet of heating surface. As it has been found economy to get a high rate of combustion per square foot of grate surface, better results being obtained with 20 pounds of coal per square foot of grate than where only 10 to 12 pounds are burned, and as above pointed out, no damage can occur from the higher temperature due to higher rates of combustion, therefore it is claimed that this boiler can be made to give a better result for a given first cost than any other class,

### TESTS AT THE BROOKLYN WATER WORKS, RIDGEWOOD PUMPING STATION.

*Requirements.*—Boilers of a type internally-fired, fire-boxes corrugated and capable of an evaporation of at least 10 pounds of water per pound of good coal, from and at a temperature of 212 degrees. Each boiler capable of developing under a natural draft, a horse-power of 300, and under a forced draft, a horse-power of 500, allowing 20 pounds of water per horse-power.

*Method of Test.*—The plant furnished by the Worthington Company consists of three duplex, vertical, direct-acting pumping engines, and four horizontal, internally-fired, return flue boilers, together with the feed pumps and all necessary pipe connections, both steam and water. The boilers are from the Edge Moor Iron Co., of Edge Moor, Del., each 9 feet internal diameter and 22 feet long. One of the engines and two of the boilers were at work on the direct supply connected with the new 48" rising main delivering into the west division of Ridgewood reservoir when the tests began.

The tests of No. 814 were made from 10.30 a. m. to 6.30 p. m., on April 25, 1894. That of No. 815 from 10.15 a. m., April 26, to 10.15 a. m., April 27, a run of 24 hours; and No. 813 from 11 a. m. to 7 p. m., April 28, a run of 8 hours. Two boilers were used with each engine during all the trials, with Plymouth coal, the engine builders waiving their right to use selected coal. It was not specially screened, being taken from the overflow of coal-fill in pocket. The coal was weighed as used. Records were taken simultaneously at fifteen minute intervals during all the tests, of the length and number of strokes, the steam and water pressure, the temperatures, etc., etc. Indicator cards were taken from the high pressure, low pressure and water cylinders. Steam was examined by means of calorimeter tests. Gages and scales were tested before and after trials. Capacity of engines was determined from the delivery of the pumps during the trials, as permitted in the requirements of contract, owing mainly to the difficulty in setting a weir which would fulfill all the conditions of wire formulæ.

The results of tests as noticed below were obtained after applying all necessary corrections.

| | | | |
|---|---|---|---|
| *Temperature.* | | | |
| Water in pump-well | 56° | 56° | 56° |
| Air pump delivery | 110.60 | 93.64 | 100.40 |
| Feed water, average | 129°.26 | 167°.30 | 174°.04 |
| Engine room | 83° | 84° | 79° |
| *Boiler Data.* | | | |
| Average steam pressure, lbs. | 107.50 | 109.43 | 109.44 |
| " barometric pressure, lbs. | 14.758 | 14.742 | 14.620 |
| Weight, 1 cu. ft. feed water, lbs. | 61.581 | 60.846 | 60.679 |
| Dryness of steam taken at engine | .992 | .989 | .997 |
| Feed water through cylinders, lbs. | 50,601 | 157,014 | 50,717 |
| " " " jackets, " | 3,542 | 7,351 | 3,550 |
| | 54,143 | 164,865 | 54,267 |
| Percentage of jacket water | 7 | 5* | 7 |
| Total coal used, lbs. | 5,280 | 16,026 | 5,120 |
| Percentage of ash | 9 | 9 | 9 |
| Net combustible | 4,805 | 14,584 | 4,659 |

* Two per cent of jacket water lost by defective drain-pipe.

| | | | |
|---|---|---|---|
| *Work of Boilers.* | | | |
| Evaporation (actual conditions) per lb. coal, lbs. | 10.13 | 10.34 | 10.60 |
| Evaporation from and at 212°, lbs. | 11.33 | 11.22 | 11.43 |
| Evaporation combustible from and at 212° | 12.46 | 12.33 | 12.56 |

*Summary of the Tests*:—I find the capacity of engine No. 813 for 24 hours' run, against a water pressure of 70.853 pounds (163.506) feet to the square inch, at a piston speed of 135.874 feet per minute is 12,354,000 U. S. gallons, an excess in capacity of 23½ per cent. over the requirements of the contract; that the capacity of engine No. 814 for same time against a water pressure of 70.978 pounds (163.796 feet) per square inch at a piston speed of 134.225 feet per minute, is 12,206,700 U. S. gallons, an excess of 22 per cent. over requirements, and of engine No. 815 for same time against a water pressure of 70.826 pounds (163.444 feet) per square inch, at a piston speed of 129.756 feet per minute, is 11,800,000 U. S. gallons, an excess of 18 per cent. over requirements.

I find that the boilers at the time of the tests developed an average evaporative efficiency of 11,326 pounds of water from and at 212 degrees Fahrenheit per pound of coal consumed, using our ordinary coal (Plymouth) as a standard.

Also, that at the time of trial the three engines developed an average duty of 1,050,970 feet pounds per pound of coal fed upon grates, an excess of 31⅓ per cent. above contract requirements.

The internally-fired type of boilers show increased efficiency over those of the ordinary type used for the other Worthington engines.

I find that the construction of the entire plant is such that repairs, inspection, etc., can be easily made, that it is thoroughly efficient, is beyond the contract requirements, and that it will give an economical duty in its daily work.

L. RUSSELL CLAPP, *Asst. Engineer.*

These boilers were manufactured by the Edge Moor Iron Co., of Wilmington, Del., from designs of Geo. S. Strong, who is the representative in New York of the Edge Moor Co. for the sale of boilers.

## New England Roadmasters' Association.

The twelfth annual convention of the New England Roadmasters' Association was held in Boston last week. The President, Mr. G. L. R. French (Boston & Maine), called the convention to order on Wednesday morning, the 15th. Mr. E. E. Stone (Boston & Albany), Secretary and Treasurer, read his annual repoits, which were accepted, and half a dozen new members were elected. The following officers were elected for the next year: President, R. P. Collins (Old Colony); Vice-President, A. C. Stickney (Boston & Maine); Secretary and Treasurer, M. C. Hamilton (New York, New Haven & Hartford); Executive Committee, E. E. Stone (Boston & Albany), J. W. Drew (Old Colony), J. L. Shanks (Fitchburg), James M. Torr (New York, New Haven & Hartford). The first report presented was that of the Committee on Labor on Track, the committee being M. C. Hamilton, Samuel Greer and George A. De More. An abstract follows.

LABOR ON TRACK.

The committee assumes a seven-mile single track section or a three and a half mile double track, compensating for side tracks on the basis of two miles of important sidings or three miles of little used sidings equal to one mile of main track. The committee then lays down a schedule of the order of work, beginning with repairing of fences, burning dry grass, etc., and continuing with raising low joints, laying new rail, putting in new ties, all of which should be done by September 1st, and by the middle of July the section should be mowed and all loose bolts should be tightened in April and October. Finally, in the fall all bridges and culverts should be cleaned out. In the spring the force will naturally be increased from the winter force of three or four men and a foreman, by adding one or two men. The new rails should be laid by an extra crew if the quantity is large, the section force being increased to 10 men on gravel section and 15 on stone section, to remain until all joint ties have been secured, and then reduced to the normal of seven men and a foreman on gravel and nine men and a foreman on stone ballast. By the end of October the force can again be reduced to the winter standard.

In the discussion Mr. Shanks suggested that track should be surfaced at the opening of spring instead of first fixing fences. Other members suggested that the average of side track, which is assumed as equal to one mile of main track, will vary with the number of switches and frogs. The question was raised by the President as to the number of frogs and switches which should be taken as calling for an extra man on the section force. This was finally referred to a committee to report at the next meeting. After a little discussion the report was amended to the effect that the surfacing of track should precede in order of time the fixing of fences. It was further amended fixing the normal basis of the force at one man per mile. Another amendment was to the effect that mowing should be done by the middle of August instead of the middle of July, and still another one that all loose bolts should be tightened as soon as needed instead of in April and October.

Division Superintendent McAlpine, of the New York, New Haven & Hartford, addressed the meeting briefly, expressing his pleasure at being present. He said that: "As for the time of reducing the force, we do it when lightning strikes our way, probably about the last of October." He believes in a liberal force in the road department and that this is the last place where reduction should be made, although all officers do not agree with him. He said, "Trains are running to-day on roads where the track is absolutely unsafe."

The next report taken up was that on snow plows.

SNOW PLOWS AND FLANGERS.

The committee on this subject consists of Messrs. W. E. Clark and J. W. Shanks. The report stated that for preparing the track for the use of wing plows all

obstructions should be carefully cleared away within 6 or 7 feet so as to give a clear passage, with wings out, and that it would be desirable to run the wing plow from one end of a division to the other with the wings open to make sure that everything is ready when the emergency comes. Material should be levelled at grade crossings to the level of the rail and somewhat lower on the inside of curves. Where side tracks leave the main track on the inside of a curve the side track should be low enough to clear the point of the plow or derailment may follow, and if possible side tracks should be put so far from the main tracks as not to obstruct the passage of the wings. For running ice flangers the track should be prepared by facing the ties low enough for the flanger to clear and putting signs alongside where it must be raised.

Before starting the plows section men should clear with shovels sufficient places at stations on main line for passenger trains to stop and start, also room at sidings for passenger trains to go on the side track, including the clearing of switches and frogs, and section foremen should have authority to hire extra hands. The committee speaks very briefly of the different types of flangers and wing plows, and says that to run a plow with safety one should have the exclusive right of way, for it is a hard matter to flag a plow in case it is stopped or loses time. The committee does not discuss the rotary or other machine plows, as they are not thought essential on New England roads.

This report was adopted and was followed by that of the committee on guard rails.

GUARD RAILS.

The committee on this subject consists of Messrs. A. C. Stickney, A. R. Patch and John Walker. The report says that guard rails should be made not less than 12 ft. long, with a certain portion in the middle straight, the ends curved to give an extreme clearance of 8 inches. Guard rails of this shape can be made in the field if the rail base is not so wide as to require planing. The guard rail should be secured by braces or clamps. Its distance from the point of frog should be uniform, whatever the gage of track; that is, whether it is the standard 4 ft. 8½, or has been widened on curves. This distance should be 4ft. 6¾ inches from the gage side of the frog point to the working side of the guard rail, giving 1¾ inches between the guard rail and the main line rail, where the gage is 4 ft. 8½. This is the distance recommended by the M. C. B. Committee at its last convention, and the Roadmasters' Committee thinks that it would be well to work in harmony in this matter.

On motion of Mr. Clark the report was amended by the insertion of the words "at least" before 4 feet 6¾ inches, making the distance from the gage side of the frog point to the working side of the guard rail at least 4 feet 6¾ inches. It was decided by vote to answer certain questions submitted to the committee as follows, namely: best length of guard rail, 15 feet; portion of guard rail to be straight, one half; extreme curvature of guard rail at ends, not less than 4 inches, not more than 5; rail bases should be planed sufficiently to permit spikes to be driven between guard rail and main rail; not less than five rail braces to be used; two guard rail clamps to be applied to the rail; guard rails to be made in the shop and not by the force putting them in.

On Wednesday evening Mr. Joseph T. Richards, Engineer Maintenance of Way, Pennsylvania Railroad, delivered an address on the "Rebuilding of the Pennsylvania Railroad after the Johnstown Flood." This appeared in the *Railroad Gazette* of July 20.

On Thursday morning a letter was read from President Reed, of the Roadmasters' Association of America, expressing the hope that all the members of the New England Association would attend the annual convention of the former association to be held in New York in September and enclosing a programme of the meeting. Secretary Flagg, of the American Association, was introduced and made a short speech seconding the invitation of President Reed.

It was voted as the sense of the Association to hold the next annual meeting in Boston, but the final decision was left in the hands of the Executive Committee.

The next report submitted was that on rail joints.

RAIL JOINTS.

The committee on rail joints consists of Messrs. J. L. Torr, S. C. Paxson and T. S. Sullivan. In a brief report the committee recommends that the angle bar joint have some support beneath and that whatever combined form of joint be used it should be made of as few parts as possible so that trackmen will not be confused in applying them. The committee suggests that certain such joints should have a thorough trial during the coming year by a committee to be appointed by the Executive Committee of the Association, and names particularly the Long truss, the Continuous, the Weber and the Churchill joints. The committee believes that the conditions in New England are such that a joint should have no parts of cast material, but that all should be rolled of steel, and that in any improved joint there should be such saving of labor in maintenance and of wear of rail ends as to offset the increased cost of the joint. A number of specific questions are proposed in the report as suggestions for discussion.

Mr. Collins was not prepared to admit that the angle bar should be supported at the base. Support for the head is needed. President French moved the substitution for the recommendation of the committee that the angle bar should be supported at the base, of the following: "The angle bar not giving satisfaction we believe some joint better than that should be used." This was adopted.

Mr. Stickney said that longer rails mightbe used, or bevelled joints, or both, and Mr. Caffrey, of the Lehigh Valley, was called upon to tell them of the experience on his road. He then recited the facts, which are probably pretty well known, that the Lehigh Valley has been using 45 ft. rails and mitred joints for some years. He sees no objection to them, but does see some advantages. The points are cut to an angle of about 35 degrees. In 1889 1¼ miles of double track was laid with these rails, with an angle bar weighing about 54 pounds.

Mr. Hamilton mentioned favorably his experience with about three miles of the Weber joint. Mr. De More has used the Weber joint six years, and it has given good satisfaction. Mr. Stevens had put in some this year and is not ready to report upon them.

On motion the whole subject of rail joints was referred to a committee for further examination and for tests. The committtee appointed is Messrs. Elwell (New York, New Haven & Hartford), Stickney (Boston & Maine), Shanks (Central Vermont), Bishop (Fitchburg) and Lentell (Boston & Albany).

The next report received was that of the committee on tie plates. The committee consists of Messrs. E. H. Bryant, J. W. Drew, W. E. Tuthill. An abstract follows:

TIE PLATES.

The use of tie plates is advised on all ties destroyed by the cutting action of the rail sooner than by rot, and on sharp curves on lines of light traffic where the durability of the tie is only limited by the process of natural decay. In the former case, that is, where ties are cut out, their life will be prolonged three years, but in the case of the hackmatack ties and others that rot out in four or five years, the use of the tie plate is not advisable. It is recommended that tie plates be so proportioned as to outlast two or three or more ties which would slightly increase the first cost but diminish the annual cost per tie and would offer a greater resistance to the cutting of plates by the rail flange. The earlier forms of tie plates were too light and did not endure the natural life of the tie under heavy traffic and in yards. The benefits from tie plates are summed up as decreased yearly cost for ties and for labor of all kinds, preservation of angle bars and bolts and of good surface, double resistance to lateral thrust, and finally saving in power and wear to rolling stock through the better track.

Mr. Stickney believes in tie plates with heavy traffic and soft ties. Six years ago he put some on cedar ties, which are still in good condition, while on track alongside he will have to take out the ties inside of two years. Where there is heavy traffic he would use a plate on every tie. Mr. Sullivan endorsed Mr. Stickney's statements and Mr. Stone said that his experience of some years showed that track is 100 per cent. better with tie plates and there is a saving of 30 per cent. in section labor. Several other members spoke similarly in favor of the use of tie plates, and no one had a word to say against them.

The report of the committee was adopted and the subject continued for further report next year.

Complimentary resolutions expressing thanks to the Boston & Maine, to the supplymen and to the proprietors of the American House were then adopted and the convention adjourned.

The Boston & Maine Railroad had invited members of the Association and their friends to take part in an excursion to York Beach and over one hundred ladies and gentlemen assembled in the new Union Station, at 1 o'clock p. m. on Thursday, for the excursion. Special cars were attached to the regular train and arrived at the beach at 3.40 p. m. At the beach the party was taken to Young's Hotel, where the supplymen had provided a dinner. The party reached Boston on the return at 8:30 in the evening.

EXHIBITS.

Fairbanks, Morse & Co., Chicago, Ill.—Full sized Sheffield standard section hand car and the Barrett track jack. Model of a Sheffield automatic stand pipe.

Smith Friction Drill & Tool Co., Boston, Mass.—Smith patent friction drill, showing the drill in operation on a section of rail.

National Lock Washer Co., Newark, N. J.—Nut locked on bolt by the National lock washer.

Ramapo Iron Works, Hillburn, N. Y.—Quarter size models of a split switch and the F. W. Snow stand; also of a spring rail frog and yoked frog. Driving-wheel and car-wheel brake shoes for steel tired wheels; also large photographs showing the new yard of the Boston & Maine at Prison Point, and the Orms street yard of the New York, New Haven & Hartford, at Providence.

Continuous Rail Joint Company of America, Newark, N. J.—The continuous rail joint.

Naugatuck Malleable Company, Naugatuck, Conn.—The Daggett rail brace.

Dilworth, Porter & Co., Pittsburgh.—The Goldie spike in soft steel and the Goldie tie plate.

Ensign Manufacturing Co., Huntington West Va.—Models of the Russell snow plough.

Page Woven Wire Fence Co., Adrian, Mich.—Samples and pictures of woven wire fence.

Q & C Co., Chicago, Ill.—The Servis tie plate and the Bryant rail saw.

Sherburne & Co., Boston, Mass., representing the Verona Tool Works, Pittsburgh, Pa.—The Verona nut-lock and the improved Verona nut-lock; solid steel track gage, tamping and clay picks; double and straight wrenches, track chisel or rail cutter, spike pullers, claw bars, spike mauls and track jacks.

Pettibone, Mulliken & Co., Chicago, Ill.—The Jenne track jack.

Ruffner & Son, Schuylkill Falls, Philadelphia.—The Excelsior nut-lock.

Roberts, Throp & Co., Three Rivers, Mich.—Model of the Cyrus Roberts patented hand car.

Peter Gray, Boston, Mass.—Switch lamps and signal lights.

Pennsylvania Steel Company, Steelton, Pa.—Full size spring rail frog with the anti-creeping device. Model of the De Vot safety stand, the Duggan switch (full size pressed steel rail brace) and a full size Long safety stand.

The Weber Railway Joint Manufacturing Co., New York.—The Weber joint.

M. H. Brown, 96 Broadway, New York.—The Emerson improved rail bender.

L. McC. Shattuck, Brookline, N. H.—A patent spike puller.

Buda Foundry & Manufacturing Co., Harvey, Ill.—steel wheel for section, hand and push cars.

Elliot Frog & Switch Co., East St. Louis, Ill.—Model and blue prints of a spring rail frog and improved split switch.

Harrington, Robinson & Co., Boston, representing the Wharton Railroad Switch Co., Philadelphia.—A full size automatic switch stand.

## Engineering Education.

The second annual meeting of the Society for the Promotion of Engineering Education takes place in Brooklyn this week, it having been arranged, for the convenience of the members, to hold it in conjunction with the meeting of the Association for the Advancement of Science. The first meeting, it will be remembered, was that held at the Engineering Congress at Chicago last year, when the Society was organized. The first session of this meeting took place last Monday morning, and at that time the annual address of the President, Professor De Volson Wood, was delivered. The Society then adjourned to 10:30 on Wednesday morning; therefore, we can give no report of its proceedings this week. We give space, however, to a large part of Professor Wood's address, which is rich with the wisdom and philosophy of a long life spent in the arduous pursuit of the noble profession which he honors.

This meeting is peculiar in this sense, that it is the first meeting of a society for the promotion of engineering education in a broad sense in this country, if not in the world. It is the outgrowth of a society of instructors of mechanical engineering and of the enthusiasm manifested in the educational section of the world's engineering congress, at Chicago. One of the first fruits was the publication, under the able secretaryship of Professor J. B. Johnson, of the papers read at Chicago under the title of "Engineering Education."

This book has already been of service to educators. In less than forty years about one hundred professional engineering schools, including special courses in universities, have come into existence in this country, graduating some 1,200 persons anually. Besides these many of the other schools include some instruction in the mechanical arts and engineering subjects. This growth, spontaneous in its character, without a central head or mutual conference, furnishes a sufficient reason for the existence of this society. If its efforts are properly directed, it may make of all these schools a kind of university, in which, though widely separated, there may exist a bond of unity for accomplishing the best results in this line of education; in which there may be "unity in variety" as there will be "variety in unity." "Some things such a society cannot do, nor would it be best if it had the power. It cannot determine arbitrarily the number of schools nor the number of graduates. These will follow the law of supply and demand, and can no more be fixed beforehand than can the political economist determine the proper number of lawyers, physicians, ministers, politicians, or any element of the body politic." It may be safely asserted that there is not a demand in the country for 1,000 or more new professional engineers annualy but the fact that that number find useful employment, and that these schools are more and more crowded with applicants, shows that this kind of education is growing in popularity. But all graduates do not follow the profession of their school for life's work. These schools have opened new lines of work and raised the standing of others, as well as enlarged the field of engineering. Graduates are found in many if not in all of the other learned professions and in many departments of business. It therefore becomes doubly important that this education should be conducted on correct principles; that while the subjects for study are those of engineering, they should be so handled as to develop the mental powers. A cast-iron course cannot be made, much less enforced. There must be a certain amount of flexibility; certainly, of personality. We shall consider three topics: First, what should be taught in engineering schools? Second, how taught? Third, who shall teach?

On these points we shall speak of such underlying principles as are common to all kinds of engineering education, civil, mechanical, electrical, mining, military, naval, sanitary and others, if there be such. A young aspirant asked an eminent engineer what he should study. He replied, "Chinese." Accept the spirit of the answer and despise not the learning of anything which comes in your way. Our hopes of the future are built on the experiences of the past, but from the same history may be drawn different lessons, depending upon the bias or depth of thought of the reader. We will attempt to draw one.

About twenty-three centuries ago Socrates conversed with a few young Athenians, not on amassing wealth, nor of securing official station, nor of gaining power over men, but upon the relations of the universe, of virtue, of immortality, of God. It was a small beginning, a private school, but out of it came Plato and through his school Aristotle, a giant intellect, who wrote upon nearly every subject of human thought then known. He was not backed by a church, nor a state, nor by an army, but his philosophy held sway over men for more than eighteen centuries. This domination of intellectual power by one man is a sublime fact in history. And yet his philosophy of physical science contained such weak and glaring errors that it required only a simple experiment to show their fallacy; but during all that long period no one was thoughtful enough, or rather brave enough, to expose them. Of these one example will serve our purpose. Aristotle taught that bodies of unequal weight would fall through the same space in times proportional to their weights. Or, more simply, that a two-pound weight would fall twice as fast as a one-pound weight. At last a man arose who challenged the truth of this assertion. Galileo claimed that the philosophy was false, and in 1590, only 304 years ago, challenged his opponent to an experimental test at the tower of Pisa. On one side was the tradition of centuries, the upholders of Aristotelian philosophy, professors in the universities, jealous of the popularity and rising reputation of the young philosopher, students who clung to the popular side and the superstitious who would not, if they could, believe in anything new; on the other side was Galileo with two balls in his hand ready for the experiment, full

of faith and hope for the truth, and about him a throng who "cared for none of these things." It was a momentous occasion, two theories vital in the interests of truth were on trial. One or the other must go down. The balls falling from Galileo's hand, striking the earth at the same moment, sounded the death knell of the Aristotelian dogma. Subsequent history exalts the significance of that hour. Aristotelian physics was an utter failure, for it drew no laws from facts or in conformity therewith, and hence was powerless to explain nature. If a fact did not conform to theory—so much the worse for the fact. Since that hour facts have been the weapon for battering down false theories, however venerable or deeply rooted. Fact is a truth and a truth is the evolution of the ages. It has, figuratively speaking, been deified. . . .

The history of such an age is a lesson to all subsequent ages. It has taught that truth is not to be sought in dogma or tradition, but by honest, careful, patient study of facts, whether exhibited by nature or determined by experiment; it has also taught the worthlessness of mere speculation. Still, speculations are profitable, since they raise questions for consideration and often lead to beneficial results; but only those are valuable whose results conform to facts. All theories are at first speculation. Newton held to his conception of the law of gravitation for fifteen years before he proved it. As light creeps on gradually from night to full day, so it is with the mind as it searches after truth. Facts alone will not interpret nature—theory and law are essential. Physical law is the golden chain which binds together a series of facts into one common principle. It is a creation of the intellect—a human product. There was a time when the formulated laws of nature were considered as the very thoughts of the Creator, but precision in measurements and care in experiments have rendered it highly probable that no formula represents exactly operations in nature. The laws of gases, as first formulated, are now known to be imperfect, and no perfect formula has been established for them. Even the Newtonian law of gravitation is not known to be exact for infinitesimal distances, nor that its action is instantaneous. Galileo was the first dynamic engineer, not in the sense that he constructed any engineering works, but in the sense that he made dynamic engineering possible. He was the first scientific writer on the strength of beams. Problems involving the motion of masses could not be solved before his day, for the laws governing them were unknown, but he laid the foundation for such solutions by discovering the necessary laws which were formulated and known as Newton's three laws of motion. Strange as it seems, engineering practice involving the more refined and recondite theories of the unknown molecular actions have with a leap sprung into the foremost ranks. Electrical engineering is as closely allied to theory as any other line of engineering.

Briefly, then, whatever subject be studied, whatever exercise be performed, whether in the lecture room, laboratory or shop, let there be research and inquiry into facts, theory, law. If education be given for mere utilitarian grounds, if it is sought to transmute every formula, whether of mathematics, physics, chemistry or literature, into gold, education would not only degenerate but lose its power as an elevator of the intellect. Love of knowledge for its own sake is the highest motive for study. But the strife for place and early returns, and the comparative poverty of many who seek professional life, tempt, if not force, them to take a lower standard. The very key-note of imparting knowledge is the use of the free inquiry instead of the dogmatic method. The student should be led to discover truth as if it had not been discovered a thousand times before. The value of this method has been recognized and resulted in the establishment of many laboratories and shops, in all of which the student may make tests, experiments, and even learn handicraft. For a long time experimental research was considered a pastime for a few, but so many benefits have resulted to mankind from such investigations, securing commercial wealth and its attendant comforts and luxuries, that scientific education has come to be considered of national importance. Models for illustration need not, as a rule, be costly; all that is necessary being such as will enable the learner to gain a correct idea of the relation of parts. For this purpose sometimes a model costing a few dollars will be as serviceable as one costing hundreds. But for original research, in some cases the mechanism cannot be too accurate. Apparatus cannot be a substitute for the live teacher, but is of great aid to him. A text book in which the matter is well stated, well digested, well arranged and well printed, is one of the best pieces of apparatus for the learner. He will feel more confidence in the statements of an author than in notes taken from the utterances of a lecturer, and if in after years he has occasion to use the results sought, he will sooner turn to the book than to his lecture notes. Indeed, a text book may be considered as a course of lectures, printed after thorough revision.

Lectures, however, should not be ignored or suppressed, but should supplement the text, where books of reference, periodicals and current literature may be brought to the attention of the student. Thirty or forty years ago there was a dearth of text books in certain technics, but now there is such a multiplicity of them and such a desire to cover a large field, that there is a temptation to "cram." It is not the amount and variety of the viands put before the epicurean, or the amount taken into the system, that makes bone, sinew and physical vigor, but that which is digested and assimilated. All are learners; and graduates, instructors and amateurs will find decided advantage in becoming members of one or more of the scientific and professional societies. Personal experiences, discussions and interchange of views are of great profit to all concerned. It is not the object of the school to make engineers, but to educate them. Engineers are born, not made. The man chooses his profession, the professor instructs; but no amount of school training will supply brains, it may enable one to use even limited powers more efficiently. These ideas will give tone and character to the instruction.

All physical laws are founded on statistics. Statistical and historical facts underlie laws; their relations are that of ruler and subject How much of history and statistics shall be studed depends so much upon circumstances that no rule can be given; but the man is generally better equipped for the present and future problems in life who well understands its past. Knowledge is not complete without history and statistics. To pursue either exclusively is not education The acquiring of any number of facts is not education. Much less is that education which merely acquaints one with the fact that certain formulas are in certain books. The posessison of a library, however valuable, does not make one learned. A distinction may be made between the work of a beginner and that of an investigator. The former accepts without question those laws which by tests and experience have been considered as fixed, such as the laws of falling bodies, the laws of gravitation, etc., and then proceeds to ascertain the reason for them. The investigator may question the accuracy of any law and proceed by more careful measurements to determine anew the data; or he may proceed by the statistical method to determine undiscovered laws. Throughout history science has shaken much, but increased knowledge more. The teacher should enforce the importance of both accuarcy and precision. The distinction between these is important. To illustrate I will take an example in my own practice. I directed an assistant to set the transis over a certain stake and give the line. He did it with great precision, placing the bob exactly over the nail, leveling the plates very accurately, adjusting the eye and object glasses very nicely. Then I found that he had set the instrument over the wrong stake, two rods from the correct one. He was precise, but not accurate. Calculations are sometimes carried to many decimal places, giving the appearance of great precision, when from the nature of the case the data is imperfect. The value of the degree of precision depends upon circumstances. An error of 100,000 miles in the distance between the earth and the sun would be an error of about one-tenth of 1 per cent., but an error of 1-1,000,000 of an inch in determining the length of a wave of light would be an error of about 50 per cent. of the correct value. In construction one must judge for himself where accuracy is justifiable. The fallaceous views early entertained by Galileo in regard to momentum, all repeated and defended in text books and literature, instead of the correct view later entertained by him and supported by Newton, Leibniz, Thomson, Pate and all other recent writers of unquestioned authority in these things. And this requires, especially in regard to mechanics, a correct knowledge of the fundamental terms, such as force, acceleration, mass, momentum, energy and work. Precision may be used as a quibble for dishonest purposes. A fly was once put in a dead man's mouth that a witness could swear there was life in the man when he signed the will. One was asked if it was true that he suppressed the document. "Why, that document was printed," he replied. And so it was several weeks after the suppression. His answer was precise, but he was dishonest. Precision may or may not be truth; accuracy is truth. It is quite possible that the "what" and "how" herein set forth appear too reasonable to be questioned; but one need not go far to find that perpetual motionists and even believers in a flat earth are not extinct. Visionary theories are made doubtful or even speculative grounds. Quack scientists are abroad. It belongs to the school to conserve the truth, and to correct processes of thought and investigation. The "how" consists largely in teaching the learner how to think, how to determine facts, how to test theories; and not, as the story runs, in regard to the theological professor when asked a question—'Young man I wish you to understand you are not here to think, but to absorb.

Who shall teach? The instructor in engineering education should be one who loves to teach, who has a love for the truth and a fondness for his speciality, whose integrity is above suspicion, who has the necessary qualification, and who so assimilates knowledge that he will give something of himself to those he instructs. The instructor is fortunate who possesses personal magnetism, and when combined with a strong, pure character he exerts an unconscious power for good over his students. It is not necessary that the instructor should be an expert in the shop, the mine or the field; but a practical knowledge with the arts involved in any, or all these, better fits him for his duties. As a rule it is not desirable that a teacher of general engineering should be an expert in handicraft or be eminent in a specialty; for however much he might desire to avoid it he would be liable, unconsciously, to give undue prominence to his specialty to the subordination of other subjects equally, if not more, important. The constructor of a model of Jerusalem became convinced that he had made a more accurate representation of the city from reprints of surveys and photograhs than if he had visited it. An eye witness gives prominence to such things as impress him most strongly, but the student of facts drawn from a variety of sources is comparatively free from such impressions. Similarly with the instructor. At first sight it seems paradoxical that the best efforts and best results for technical education have come from those who had little practical experience in the arts. Inventive genius, natural ability in the art of construction, a thirst for technical knowledge and a detetrmination to accomplish certain results are all important elements. An instructor may be a better teacher than practitioner.

Instructors should not be triflers. Sufficient time has been wasted over the question, "What would be the result of an irresistible forced meeting and immovable body?" to gain a knowledge of Newton's three laws of motion. Be not enigmatical. Some profound writers have an ability of stating principles in such language as to require patient, prolonged, profound study to determine their hidden meaning. Such writing, though often of untold value to the science, should be translated and interpreted by the instructor before presenting the subject to the beginner. He should have a scholarly spirit. A love of knowledge for its own sake and not for commercial purposes is the inspiring sentiment of the true student. He who discovers truth in this spirit is repaid by the joy experienced. If this love of learning be not possessed by the instructor he cannot impart it to others. Remove it and study becomes mechanical and a burden, and the highest grade of study crushed out and years of labor may be wasted. Learning merely for the purpose of appearing to be learned, or merely taken in to be given out does not promote culture, but may give a certain externality. Whitewash, thick or thin, is only a temporary covering. If one appears to exhaust himself with every effort he cannot exert a lasting impression. The living spring only is exhaustless. Muddy water may be mistaken for deep water, but the illusion is dispelled with a measuring rod. Great men receive knowledge from every source, even from a student; and he who can without injury to himself say, "I do not know" is truly great. A professor once made this noble remark to a class: "I care more what you will think of me twenty-five years hence when you are fighting life's battles than what you think of me now." Let such far-sighted wisdom be the sentiment of this society This society is to exert an influence, and it is hoped a lasting influence, on engineering education. Let the foundation be well laid, to serve, not only the purposes of to-day, but of the future. Let it be enduring.

The possibilities of the future are great with hope, and the educated engineer is to be one of the important factors in the development of the resources of the world. Already the lives of individuals and the fortunes of men are at his disposal. "Time is money" in a more utilitarian sense than ever before.

The real question in all legitimate business, is not, how shall waste be reduced to the smallest amount, but rather how shall the highest efficiency be secured when all the elements involved are taken into account? Waste accompanies profit.

The naval battles of the present are fought by the engineer. The Yankee cheese box on a raft revolutionizes systems of warfare. It is now the battle of the metals. The success of land battles may yet depend more upon the skill of the engineer than upon the number slain. Rapid communication and construction have done much in alleviating the distress of those who carry arms in this most horrible method of settling disputes. But the greatest monuments to the engineer are found in the arts of peace. The combination of the engineer, the inventor and the capitalist in the production of canals, railroads, the extraction of metals, transportation by steam, the application of electricity, agricultural implements, sanitary improvements and of numerous labor-saving machines, are modifying the habits and customs of society and producing a greater revolution than the armies of a conqueror. The labor-saving machine is also labor-making. It not only opens a new line of manufacture, but furnishes new fields of labor for those displaced. It forces a redistribution of labor. It may increase the number of mechanics, shippers, salesmen, clerks, officials and promoters of new enterprises, or it may increase some of those and diminish others; but so complex are these changes that no lynx-eyed observers can trace their bewildering paths. These energies give increased power to those who direct them. In the hands of the beneficent they increase comfort and blessing; in the hands of the selfish and designing, misery and degradation. Education elevates. It is the province of the engineer to harness the forces of nature and make them serve the interests of man. With increased facilities for storing and transmitting energy, wind, water falls and tides will be more useful in supplying power, light and heat where desired. Thus the scientific method is working itself out in various directions, and it is the province of this society to consider the means of promoting that education which shall be best for those who are to labor in this sphere of life's work.

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The provisional program for the meeting follows:

*I. Before the Whole Society.*

Entrance Requirements Common to all Engineering Schools; F. O. Marvin, Kansas State University.

Engineering Education and the State University; Wm. S. Aldrich, University of West Virginia.

Specializing in Engineering Education; Robt. Fletcher, Thayer School of Civil Engineering.

Text-books Considered as Such and Not as Works of Reference; C. H. Benjamin, Case School of Applied Sciences.

Graduate and Post-Graduate Engineering Degrees; Palmer C. Ricketts, Rensselaer Polytechnic Institute, Geo. F. Swain, Mass. Inst. Technology, Robt. H. Thurston, Director Sibley College, Cornell University.

Comparative Value of Graduate Study in Engineering; Wm. H. Burr, Columbia College School of Mines.

Teachers and Text-books in Mathematics for Engineering Students; Mansfield Merriman, Lehigh University.

Teaching Engineering Specifications and the Law of Contracts; J. B. Johnson, Washington University.

Teaching Mechanical Drawing and Lettering in Engineering Schools; J. J. Flather, Purdue University.

Early Instruction in Physics and Mechanics; C. M. Woodward, Dean of School of Engineering, Washington University.

Some German Schools of Engineering; Storm Bull, University of Wisconsin.

The Organization and Conduct of Engineering Laboratories and the Equipment of the Laboratories at the Mass. Inst. Tech.; Gaetano Lanza.

*II. Before the Civil Engineering Section.*

Minimum Laboratory Work and Equipment in a Civil Engineering Course; Dwight Porter, Mass. Inst. Technology.

A Few Mistakes in the Conduct of College Field Practice; O. V. P. Strout, University of Nebraska.

The Teaching of Structural Engineering; Edgar Marburg, University of Pennsylvania.

Relation of Practical to Theoretical Work in Civil Engineering Courses; Olin H. Landreth, Vanderbilt University.

The Education of Civil Engineers for Railroad Service; C. Frank Allen, Mass. Inst. Technology.

*III. Before the Mechanical and Electrical Engineering Section.*

Mechanical Laboratory Equipment; R. C. Carpenter, Cornell University.

Mechanical Laboratory Work at Ames, Ia.; G. W. Bissel, Iowa Agr. College.

Amount and Kind of Shop-work Required in a Mechanical Engineering Course; C. W. Marx, University of Missouri.

Electrical Engineering Laboratories; D. C. Jackson, University of Wisconsin.

Teaching Industrial Applications of Electricity.

Teaching Machine Design; Prof. J. H. Barr, Cornell University.

Seminary Work in Mechanical Engineering at the University of Michigan; M. E. Cooley, University of Michigan.

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## American Association for the Advancement of Science.

The forty-third annual meeting of the American Association for the Advancement of Science was held in Brooklyn, August 16-22, at the Polytechnic and Packer Institutes, Dr. Daniel G. Brinton, of Media, Pa, presiding.

The retiring president, Prof. William Harkness, of Washington, D. C., introduced the president-elect on Thursday morning, and an address of welcome was made by Dr. Freeman J. Backus, president of the Packer Institute, in the absence of Mayor Schieren from the city, to which President Brinton responded. The afternoon was devoted to the adresses of the several vice-presidents. The address of the retiring president, Prof. William Harkness, at the Academy of Music in the evening, was on the "Magnitude of the Solar System," which was followed by a brilliant reception in the Art building, adjoining, and connected with the Academy.

The several sections listened to about two hundred papers, besides the large number read before nine affiliated societies and two clubs of the Association. Lectures on popular scientific subjects were given in the evening, one by Mr. B. E. Fernow, on the "Battle of the Forest."

An unusual number and variety of excursions enlivened the meeting, and exceptionally cool weather seemed as if made to order. The attendance of members was about five hundred, which is above the average of recent years.

San Francisco was indicated as the preference of the Association at the next fall meeting. Forty-two new fellows were elected, and the following officers, among others: President, E. W. Morley, Cleveland; Vice-Presidents, E. S. Holden, mathematics and astronomy, Lick Observatory, Mt. Hamilton, Cal.; physics, W. Lee Stevens.

Troy, N. Y.; mechanical science and engineering, William Kent, Passaic, N. J.; economic science and statistics, B. E. Fernow, Washington, D. C.; Permanent Secretary, F. W. Putnam, Cambridge, Mass.; General Secretary, James Lewis Howe, Louisville, Ky.; Secretary section of mechanical science and engineering, H. S. Jacoby, Ithaca, N. Y.

EARLY BRIDGE BUILDING.

At Tuesday afternoon's session Prof. Plympton gave a few notes on "Early Reminiscences of Iron Bridge Building." Among other things, he said that the construction of iron truss railroad bridges was only fairly begun in 1856. Prof. Plympton, with the aid of another engineer, built two iron bridges in 1856, using the Whipple truss. The material was so distrusted that careful test of all tension members was necessary. A testing machine was built and the testing fell to him. The machine was quite constantly at work for four or five months. It was popularly and erroneously believed that iron, if kept under strain or subject to vibrations, would decay, and become granular, weak and brittle. He labored to disprove this, and substantially did so. The outcome of the tests in this direction was a settled conviction that in iron bridges eye bars should replace both welded links and diagonals with screw threads.

Prof. Plympton's associate soon after this built the first iron bridge that was pin-connected throughout. "The experience with welds was instructive. It had been asserted that a defective weld could be detected by the imperfect ringing sound when struck. We found by testing, that rods or bars joined by welding, would respond satisfactorily to the ringing test when only a thin shell of outside metal was perfectly joined. I pulled many bars asunder that had passed the inspection of the master smith. The Herring test with a magnetic needle would have speedily detected these failures, but it was not then known."

Prof. Plympton then related two reminiscences of bridge building between 1852 and 1861, which have never been published. One, the Remington bridge, designed by the inventor of the Remington rifle, erected over the Mohawk in 1852-53, "which was widely advertised as an entirely new system. The construction consisted in laying pine timbers side by side, one end of each stick being securely anchored to the river bank, while the other extended out over the stream overlapping a similar stick from the opposite side. Floor planks were laid crosswise. This bridge broke of its own weight before the flooring was quite complete. It was replaced by a suspension bridge.

"The other instance was the building of a military suspension bridge over the Gauley River, in 1861. The government called for a bridge of sufficient strength to permit the passage of General Rosecrans' corps, allowing twenty-four days' time. The abutments and piers of the former bridge remained in good condition. Murphy submitted an original plan, which was accepted. The plans were drawn up by Mr. Murphy on the cars, while he was traveling to Washington to submit his ideas to the United States army engineers. The plans were accepted and Murphy at once went to work. Four one-inch wire ropes, laid side by side, formed his cable. A pyramidal tower was constructed of heavy timbers, and in place of suspending rods a loosely-formed truss was hung upon the cable without fastening. This truss, connected with the floor of the bridge, was finished on the 22d day after receiving the order to build."

## Tests of Screw Stay Bolts.

It is the purpose of this article to assemble in a condensed form for reference, results of tests of screw stay bolts made at various times and by different experimenters.

The most exhaustive tests of the resistance offered to bulging by flat surfaces stayed in different ways are those made by the United States Navy Department in 1879. A preliminary test was made to determine the shape of head for the stays, that would offer greatest resistance to being stripped off. Flat vessels made of boiler plate one-half inch thick were used, some of which were stayed with screw stays without heads on the outside of plates; in others, the stays were provided with the ordinary low conical head and were also screwed into the plate; and in still others, the stays had button heads, in addition to being screwed into the plate. Table No. 1 gives the results obtained in bursting the vessels, the stays being one inch in diameter, and spaced four inches centers. At each failure of the vessel the ends of the stays stripped, allowing the plate to bulge.

TABLE NO. 1.

| Kind of Head on Stay. | Ultimate average strain to pull bolts through ½" plate. |
|---|---|
| Screwed into plate, but not riveted | 21,970 |
| Screwed into plate and low conical head, 3 threads left for riveting | 25,147 |
| Screwed into plate and button head. Length of bolt equal to 7/16 Diam. left for riveting. | 33,791 |

These results indicated that the button head resisted stripping better than the other forms, and the tests were continued using only this shape of head. Tests were made with iron plates and iron stay bolts, steel plates and iron stay bolts, copper plates and copper stay bolts, and copper plates and iron stay bolts. Because of the universal use in America of iron and steel in boiler construction, we give, in Table No. 2, only the results of the tests with these materials. The information published by the navy department gives the data for each vessel tested, but we have condensed these and give only the average of the several tests of the same conditions. Each amount in the table, therefore, is the average of several tests.

There is nothing in the report to indicate whether the tests were made with steam pressure, and the parts subjected to the temperature corresponding, but it is probable that they were hydraulic tests, and that cold water was used. Tests of materials made at the Watertown Arsenal, noted in the *Railroad Gazette*, May 9, 1890, show that the strength of iron and steel increases from a temperature of 200 degrees Fah. to 500 degree Fah., so that it is probable that the bursting pressure given in Table No. 2 would have been a little greater had the vessels been heated to the temperature of steam at 150 or 200 pounds pressure.

TABLE NO. 2.

| Material in stay bolt and plate. | Thickness of plate. | Diam. of bolt inside of thread. | Center to center of supporting bolts. | Mean diam. of head after riveting. | Thickness of rivet head at crown. | Plate commenced to bulge at. | Bolt or plate gave way at. | Total bulge of plate after rupture. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Inches. | Inches. | Inches. | Inches. | Inches. | Pounds. | Pounds. | Inches. | |
| Iron stays } " plates } | 3/8 | .768 | 4 | 1 1/8 | 13/32 | 5,666 | 19,072 | ½ | Bolts pulled through; three good threads left in holes; plate cracked back on two sides of hole ⅜ inch; rivet head stripped. |
| do. | ½ | .912 | 4 | 1 7/32 | 11/32 | 14,416 | 35,442 | ½ | Threads generally left good. |
| do. | 3/8 | .768 | 5 | 1 1/8 | 13/32 | 5,008 | 16,923 | 11/16 | Heads stripped; three good threads left; plate cracked 1 in. |
| do. | ½ | .912 | 5 | 1 7/32 | 27/64 | 11,316 | 32,245 | ¾ | do. |
| Steel plates } Iron stays } | ¼ | .765 | 4 | 1 1/8 | 3/8 | 4,666 | 16,436 | 9/16 | do., except no crack in plate. |
| do. | ¼ | .764 | 5 | 1 7/32 | 3/8 | 3,286 | 15,733 | ¾ | do., except no crack in plate. |

The most instructive facts brought out by the tests were the way the bulging of the plate separates the threads in the plate from those in the stay and the way in which the head of the stay is sheared off. The bulging of the plate between the stay bolts, converts the head of the stay into a fulcrum, and this action separates the inside edge of the plate around the hole, from the stay bolt and leaves only the over hanging edge of the stayhead to support the stay. The two illustrations indicate what is meant better than words will describe. Fig. 1 represents the button head

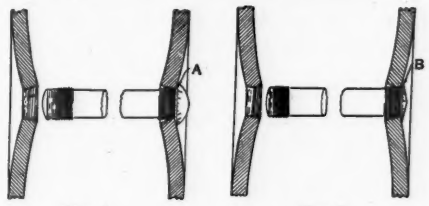



Fig. 1. Fig. 2.

Tests of Staybolts.

with which the best results were obtained; it will be noted that at A there is much more material in the head of the stay to resist shearing, than there is at B, Fig. 2, which shows the conical head usually made upon stay bolts. In each figure the right side shows the appearance of plate and stay and their relative positions when the vessel was subjected to pressure, and the left side shows the appearance after the stay head has stripped.

Experiments were made two or three years ago in the laboratory of a railroad company to find the best means of securing stay bolts to the plates and to find how the difference in temperature affected the strength of material. Flat vessels made of ⅜-inch plate and supported by stays one inch in diameter, were used. In some cases each stay was provided with a nut under the plate; in others, with a solid head, a washer being provided between the head and plate; while in others, the end of each stay was riveted over as is the general practice. Vessels with each method of staying were tested to the bursting point at various temperatures. The results obtained are given in table No. 3.

TABLE NO. 3.

| Staybolts, how secured to plate. | Bursting pressure; pounds. Cold. | Black heat. | Dark red heat. | Bright red heat. | Remarks. |
|---|---|---|---|---|---|
| Screwed into plate; with nut and riveted over outside of nut. | 23,900 | 19,400 | 22,400 | 8,700 | Pulled through plate, nut breaking off. |
| Staybolt with solid head; screwed into plate; washer between head and plate. | 31,700 | 36,000 | 26,700 | 8,500 | Head pulled off; pulled through plate. |
| Screwed into plate and riveted over. | 21,500 | 22,000 | 9,400 | 8,100 | Pulled through plate. |

The foregoing tests were all made in such a way that the stay bolts were subjected to only a direct tensile strain; it was impossible to introduce the destructive bending and rebending to which stays are subjected in everyday use by the unequal expansion of the inner and outer plates. A committee of the Southern and Southwestern Railway Club made some experiments in the Spring of 1893, for the purpose of determining what form of stay bolt and thread are best to withstand frequent bending. The report of this committee appeared in *Railroad Gazette*, July 28, and August 4, 1893. Three designs of stay bolts were used in the bending tests; one was threaded with a sharp "V" thread throughout its entire length; another was threaded by dies having threads flat on top and bottom, and the third had the thread turned off in its middle portion. These were then bent till a crack showed. The two pieces threaded throughout their length, bent to an angle of about 90 degrees, and the third from which the thread had been removed, bent to an angle of about 180 degrees without cracking. The pieces were one inch in diameter and the material showed in the tension machine the following physical properties: elastic limit 30,000 pounds per square inch, ultimate strength 51,750 pounds and 42 per cent. elongation in two inches.

The committee also made experiments to find how many times a ⅞-inch or 1-inch stay bolt from the above material, could be bent back and forth till a fracture appeared. The results are shown in Table No. 4.

TABLE NO. 4.

| Kind of Staybolt. | Number of Vibrations. | Remarks. |
|---|---|---|
| ⅞-inch bolt, V thread | 116 | Cracked. |
| " " flat " | 196 | " |
| " " thread removed at middle. | about 196 | Break at root in last thread left on. |
| 1-inch bolt, V thread. | 24 | Cracked on both sides. |
| " " flat thread | 22 | Cracked on both sides. |
| " " thread removed at middle. | 46 | Crack just showed. |

The method of subjecting the bolts to vibration in these tests was as follows: One end of each bolt was secured in a steel nut placed in a shaping machine, and the other end was vibrated to the amount of one inch. The committee made further vibration tests with hollow rolled and drilled stay bolt iron; the amplitude of the vibrations was only one eighth of an inch with these bolts, and the number of vibrations were between 50,000 and 100,000. This number of vibrations cannot be compared with those given above for solid bolts, for in one case the amplitude was one inch and in the other one-eighth of an inch.

## Fire Protection in Chicago.

It has been proposed, since the recent disastrous fire in the lumber districts of Chicago, that steam pumps be placed on tug boats by the city in order that they may be able to render assistance in case of fire within reach of hose from the lake or river. The idea is favored by city officials and also by a number of the owners of tugboats, who think that with such means of protection to themselves available at all times there would be less difficulty in securing favorable rates from the insurance companies.

## Railroad Valuation in California.

The California State Board of Equalization has reported its valuation of the railroad property in the state for tax purposes for the year 1894. The total is $42,730,640, about $250,000 more than for the year 1893. The Pullman Palace Car Company is included (about $141,000) with the Southern Pacific.

RAILROAD GAZETTE

[EDITORIAL ANNOUNCEMENT.]

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

That Mr. Reinhart should cease to act as a receiver of the Atchison was inevitable after Mr. Little's exposures of some of the peculiarities in the system of accounting and reporting that has prevailed under his direction, for reorganization was difficult, if not impossible, so long as a man so discredited remained at the head of the property. It is not right to say that the peculiarity of the Atchison case consisted in being found out, and that other railroads make rebates in violation of the law. So they do, and we fear that they will do so for a long time to come; but the Atchison not only broke faith with other roads and broke the law, but carefully misled the public as to its earnings and income; investors were studiously deceived as to the probable value of what they were buying. This is the worst aspect of the case. The appointment of Colonel Walker to succeed Mr. Reinhart will, we judge, help to restore confidence in the management. His long experience on the Interstate Commerce Commission, and as chairman of the two great associations which he directed in Chicago, has given him an intimate knowledge of the crooked and of the straight methods by which the railroad companies get business, as well as familiarity with their methods of accounting and reporting; and his personal character is entirely above suspicion. His attitude towards the railroads, both when he was acting as their critic and judge and when he was acting as their employee, was reasonable, conservative, courageous and candid. It is true that he has not the advantage of long training in high place in the actual management of railroads, but his present position is one in which a resolute and commanding character and a reputation for downright integrity are worth more than any amount of technical experience.

The principal "strike news" nowadays consists of statements about the appeals of mayors, citizens' committees and so on, for the reinstatement of railroad employees who left their work on account of their sympathy with the American Railway Union. From St. Paul it is reported that a number of railroad men have decided to try their fortunes in Brazil or South Africa. It is stated that two firemen who tried to get jobs there have brought suit against the Burlington for blacklisting them. An Omaha dispatch states that the number of old Union Pacific men who have been formally discharged is 2,000, and it is stated that in most cases "the men do not blame the company for the action taken." In view of their very recent success in getting Judge Caldwell to keep their wages up, in spite of the great falling off in business on that road, and contrary to the judgment of the practical managers of the road, who had for years been very liberal with the men, we should say that this is a very level-headed view. In fact, for men who do not know when they are well off we think the recent strikers on the Union Pacific are the most shining examples that we have seen for a long time. Another instance of foolishness worse than usual is that of the men on the St. Louis Division of the Mobile & Ohio. The Mayor of East St. Louis, voicing the sentiments of a citizens' meeting, asked for the restoration of the employees who struck on this division; but he is answered by Mr. Mann, the Assistant General Manager, that the places of the strikers have been filled, not with green outsiders, but with competent men from other divisions of the same road, who had been laid off on account of slack business; and the Mayor is reminded that these strikers are among the very men who only a short time ago had their wages adjusted by a board of arbitration. This arbitration was the result of several weeks' conference, in which all the grand chiefs participated, and the results were embodied in written contracts which were signed by both parties. It will be remembered that these arbitrators decided that the reduction of wages should be only about half what the railroad company had proposed. The outcome shows how much dependence can be placed on the signature of a grand chief when he is acting for his so-called constituents.

### Some Pass Literature.

Since we published a week or two ago the pungent letter of Mr. J. T. Brooks concerning passes, and a short statement of the position which the *Railroad Gazette* has taken in former and recent years on this matter, the chief executive officer of one of the most important of the trunk lines, whom we will call Mr. X, has sent to us a batch of letters, being mostly applications for passes and in a few cases official correspondence with relation thereto between officers of the railroad in question. The letters are mighty interesting reading, and they are crowded full of suggestion for the social philosopher. They come from all classes of society. The wife of a poor Nebraska farmer whose handwriting is painfully neat and whose spelling is a little unreliable, frankly asks for a pass for the reason that she is poor and very homesick, and because she supposes that the railroad company would not feel what to her would be a very great thing indeed. A prosecuting attorney is bumptious and says very plainly that he can help the railroad company more than the circuit judge who actually has an annual pass in his pocket. A bishop of the church is as dignified as a man very well can be when he is begging and puts forward no claim whatever, but simply says that he holds annuals from other railroads and if it is the custom of this particular railroad to give passes he would like one. In other words, he wants all the snaps that there are going, although he does not demand them as belonging to him by rights. A judge of a circuit court is too crafty to write himself, but he sends a verbal message to a local officer of the railroad company, in which he suggests very plainly what he can do and what he would like to do for the company. Between the farmer's wife and the judge and the bishop, representatives of pretty nearly every class of society appear, and we grieve to say there are plenty of editors. But everybody seems to have gone crooked in his morals and intellectuals so far as the railroad is concerned. Ordinary notions of dignity and even of decency, and the ordinary conceptions of the rights of property, seem to be quite suspended when these citizens of the republic come face to face with their railroads. We will give a few choice examples drawn from this mass of correspondence.

The treasurer of a little inland college writes some seven or eight pages to tell how he has devoted his time and "vital energies" to building up the college. A sister of his wife, who held some office in the staff of the college, died in the service, and he calls that "laying down her life for the cause." In consideration of the expenditure of his "vital energies" in getting a living as treasurer of the college, and in consideration of the fact that his sister-in-law happened to die while she was employed there instead of having died while not under pay, he wants a round trip pass for himself and family, that is, for himself, his wife and three daughters. He suggests that he has been able to send a good deal of travel over the road that but for his influence might have gone over a rival road; but it does not seem to occur to him that he has either done what any decent fellow would do for his friends in pointing out the best route for them to go by or else he has done an injustice to the rival road. Thus do folks' morals get twisted when they go into this business of begging passes. Finally, when the somewhat stiff-backed, or as he probably would have said, the arrogant Mr. X, declines to give the pass, he writes in a tone of great grief. He says "in fact I never met a more keen and stinging disappointment." He adds, "however, I shall be true to myself," and says in a postscript that "as a result of the outlay of the vital energies of the subscriber the passenger business of the railroad will be increased by a large per cent." We do not precisely know what he means by being true to himself, for he fails to specify, and probably he did not know himself.

One letter is from a young man who confesses that he has been "tough," having been a heavy drinker. He has stopped drinking and reformed, but is unable to support his wife, who has gone home to her parents. Now he wants very much to see his wife, and begs that to that end the kind-hearted superintendent will send him a trip pass. This, Mr. X declines to do, thinking very properly that it is highly undesirable that the two should come together, for the fewer people there are in the world of that young man's kind the better. Doubtless the young man immediately became an inflamed Coxeyite, and has a low opinion of the bloated monopolies which run the railroads.

A young man who has been a drunkard and otherwise wayward, has reformed and is engaged "wholly in the work of the ministry and the salvation of mankind" and has written a book giving a sketch of his own unsavory career. He proposes, on the last two pages of this book, to recommend to its readers some through line of railroad from west to east, and would like to recommend the railroad in question for such part of the route as he has in mind. He will charge nothing for this recommendation, providing "you will pass me on all parts of your road for one year from the time of publication." Mr. X declines to lend himself to the scheme of regeneration through blackmail and fraud, and the populist propaganda probably got another eloquent voice. Another man who has started in to save mankind wishes to go with his wife and four children to some place in Missouri to which he has "been called" to establish some kind of a regeneration factory. He therefore asks a pass for himself, his son of 16 and two other children.

Of course the usual crop of fraud and forgery appears. Women seem to be particular sinners in this kind of petty crime, probably because they have come to think that railroads and custom houses are the legitimate prey of mankind anyway; but people of more worldly wisdom are not above beating the railroads. For example, a member of the state legislature hands his pass over to another person, and the alert conductor promptly gathers it in and returns it to the proper office. Whether or not the member of the legislature got pay for the use of his pass does not appear. So, it is not an unusual thing to see editorial passes taken up because they are in the hands of persons to whom they were not issued.

The case of the judge, of which we have spoken above, is worth mentioning again. A legal officer of the railroad says that when he was arranging for a certain case to come before this judge in the Circuit Court, the judge asked if he would not get a pass which he (the judge) held changed to include his wife. The lawyer says, "I could not do less than say that I would make the request, as we have another case to be brought before him next Wednesday." So the judge's pass was sent to Mr. X, "without expressing my opinion of the man." We regret that that judge never had a chance to know what the lawyer and Mr. X thought of him. The judges are perhaps not the worst offenders, but it seems to us particularly odious that they should ask for passes. One who has lost his annual writes for a trip pass. Two others, district judges, ask the local agent to procure trip passes for them. Another one, a circuit judge, asks the Deputy United States Marshal to do this business for him.

The clergy is not so largely represented in this batch of letters as in some others that we have seen, but there are some flagrant cases. We have mentioned that of the bishop and of the reformed young man who has gone to preaching. One reverend gentlemen returns a half fare pass and says: "Allow me to thank you for and to return the ticket which you were kind enough to send me. I do not intend using it, but rather to throw my little influence on the other road as a matter of greater convenience and advantage." Mr. X sends this letter to the general superintendent of the rival road, saying: "I enclose a letter just received from the Reverend Father Blank. You see what it cost me to keep my word with you. This is only the beginning; perhaps ex-communication may follow. Please return the enclosure, as I may never again have so fine a specimen of the hand writing of this eminent divine." The superintendent of the other road promptly replies that he also will decline to give more than the clergyman's half fare.

A clergyman and editor of a religious paper says that he is "touring through the Atlantic cities and writing up localities and routes," and asks for a pass over the road in question, saying that he will, of course, take pleasure in complimenting it as a return. We are glad to observe that the endorsement of this letter is "regret to decline."

Of course, public officers of high and low degree appear unceasingly in this batch of letters. Governors of states and mayors of cities, councilmen and aldermen, county clerks and sheriffs appear in melancholy monotony. It would take too much room and be too tiresome to brief the letters from members of the houses of representatives and senates of the states, but these gentlemen ask with serene confidence for passes for themselves, their wives, their children and sometimes for strangers within their gates. One letter is from a prosecuting attorney in a Western state. He says that he had asked for a pass a couple of months before and had received a printed blank saying "that in accordance with the policy of the company it could not be granted," or something like that. Concerning this he says: "No doubt you are greatly troubled for passes, but to send me a letter like that, with additional words that you would like my co-operation in carrying out this much-needed reforms, and refusing to grant me the pass, is rather presumptuous, for I have daily to grant favors of the law of a great state for your railroad. Your men are all liable to state prosecutions for running trains on Sundays, also for letting trains stop across public streets in towns and cities, and in other ways. You give passes to judges

whose salaries are much larger than mine, and my pay depends on the number of successful proscutions that I procure, as it consists mostly in fees," and more to the same effect. This impudent letter is endorsed "declined," we are glad to see. We fear that few railroad superintendents would have had enough backbone to refuse the request of the roguish prosecuting attorney. The deputy attorney-general of a Western state, who is going to get married, would like a pass for himself and wife, and adds that he will feel under many obligations. This request was declined.

One of the most impudent letters from a state official, almost as impudent in fact as that of the prosecuting attorney, is from an inspector of illuminating oils. He wants a pass for himself, and he encloses also a list of his deputies, hinting mildly that it might be worth while to have them in mind. He is a persistent fellow, his letters turning up in successive years, and when his request is declined he asks for a reconsideration because very large quantities of oil are shipped over the road into the state of which he is an officer, and he will have a good deal to do in the way of establishing depots of inspection, and so influencing the direction of trade, and he thinks that friendly and courteous relations between himself and the officers of the railroad would make things smooth and pleasant. Of course this man only wants the opportunity to become a rogue and indeed is courting that opportunity. Whether or not he got his pass there is nothing to show.

A former Speaker of the National House of Representatives asks for passes for his wife, his wife's sister and her cousin. The Lieutenant-Governor of a state asks for an annual and says: "In appointing my committees I have favored the railroads, believing that the interests of the state demanded it." Probably they did demand it, but what a commentary on the sense of public duty in high office this Lieutenant-Governor's request is. A member of the House of Representatives of another state asks for an annual, saying that he is aware that the constitution of the state interdicts the granting of passes, but various railroads have given passes to his "legal brothers" as attorneys, so he seems to think that the law can be neatly evaded and the petty fraud committed upon his constituents, and he keep out of jail.

A particularly persistent fellow is the Speaker of the House of Representatives of a western state. He has received the superintendent's letter saying that he is not authorized to grant passes to members of the Legislature except while the Legislature is in session, but he explains that he is the Speaker of the House and therefore expects and receives special privileges, and has in fact received annual passes from all the other railroads from which he has asked them. We do not know what his luck was, but knowing our friend we suspect that the persistent Speaker had to pay his own fare during the vacation.

The chairman of a state political campaign committee modestly asks passes for a period covering the campaign for 21 persons, in order that they may make a thorough canvass of the state. He says: "Although the ideas of our party may not fully accord with your own, it is very certain that in the event of success we may be able to do you some substantial favors." A man writes from the Hall of Representatives of the state and says that he has done much to defeat bills affecting the road and would like an annual. A member of the House writing concerning this man says that he is not a member, but a lobbyist, and that he knows of his having done nothing whatever of any value for the road in question. An official of a state's prison expresses obligation for the superintendent's unexampled generosity in complying with his request for a half-fare pass, and adds "should it ever fall in my way to do you a favor, I shall certainly improve the opportunity." Mr. X attaches to this letter an elegant woodcut of the prison itself, which doubtless suggested the sort of favor that he might expect. Of course the chief of police asks for a pass, and so does the fire-marshal for himself, and from time to time for various men in the fire department. Why a railroad company should not get police and fire protection without being laid under special tribute, we do not quite see. Another document is an expired annual pass for a member of Congress. The sheet to which it is attached contains the laconic endorsement, "He said not a word." Probably Mr. X did not know when he was well off or he would have said, "Luckily, he said not a word."

One obnoxious letter is from the editor of the agricultural columns of an important provincial paper. He has received a printed circular replying to his request for a trip pass and regretting that the pass cannot be sent. He has for a great many years been connected with the agricultural press and done more than any one man to increase agricultural production, by which the railroads live, and now this insignificant request for a trip pass for 200 miles and return is declined. With burning indignation he writes: "Very well; the day is past when railroads shall rule the world. The privileges and bonuses and royalties that heretofore have been asked and received are things of the past, never again to be repeated." What this terrible hog editor did to the railroads nothing in the correspondence before us reveals.

There are one or two pleasant spots in this melancholy record of human weakness. One member of Congress returns an annual pass and says: "Accept my excuse for the apparent want of civility on my part toward you personally in returning this pass. It is my uniform rule, adopted in all like cases, so long as I am a member of Congress." Another letter hints at a little episode of which we would like to know more. The writer says: "I write to return to you my very best thanks for your Christian conduct in not giving my daughter a pass to take her further from her home. Her mother and the rest of the family, as well as myself, feel deeply grateful for the goodness of God in directing her into the hands of those who are worthy of the name of men, also for your further kindness in enabling her to reach home. Please convey our thanks also to the other officers of your road, and may you all be rewarded for doing right."

Quite an unusual and a very gratifying document is a letter from a great daily in one of the most important cities of the country returning two annual passes for members of the staff of that paper. The editor says: "Desiring to encourage the movement for abolishing the deadhead business, I return the enclosed passes and notify you that this journal will hereafter neither extend gratuities to nor receive them from railroads."

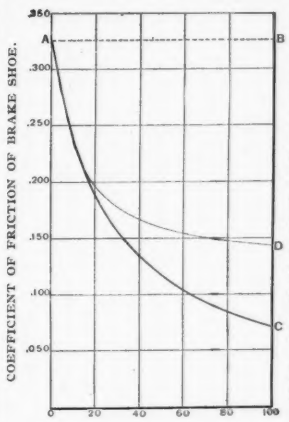
The mass of letters from which we have made these very brief extracts, constitutes what some of the end-of-the-century editors would call a remarkable "human document." We give space to it not for the information of railroad men, for those who have had much experience in high position are very familiar with this undignified aspect of humanity; but perhaps what we print will reach some people of influence to whom the pass question is still a mere abstraction and will reveal to them what a demoralizing fact it is. It is not so much the direct loss of revenue to the railroads, although that is an important item, but it is the distortion of the moral sense which seems to us the really serious part of this business. If the constitutional convention, now trying to give the state of New York better government, can abolish, or even restrict, the giving of free passes in that state, it will by that act alone justify its existence.

## Holding Power of Brakes at High Speed.

In the admirable volume entitled "The Effect of Brakes upon Railway Trains," recently published by the Westinghouse Air Brake Company, is an interestng preface reviewing what is known at the present time about the friction of brake shoes in railroad service. Among other things, the preface gives a table showing the co-efficient of friction of brake shoes as determined by the Westinghouse-Galton experiments. The table also gives a formula for the friction at different speeds which has constants, or factors, which are derived from the results of the experiments by the method of "least squares," which is a plan used by mathematicians to reduce the variations and errors to a minimum. The formula practically coincides with the observed results up to about sixty miles an hour, which is the highest speed at which observations were made. Beyond this point, if the law that is indicated by the actual results and set forth by the formula, viz., that of the reduction of the friction as the speed increases, holds good, then the holding power of brake shoes at 100 miles an hour must be very small compared to what it is at ten miles an hour. According to this law, the holding power at 100 miles an hour is less than one-third of what it is at ten miles an hour and only one-half of what it is at forty miles.

It is not new information that brakes used on railroad trains have less holding power at high speed, as this has been known since the publication of the results of the experiments of Westinghouse and Galton, in 1878; but the fact that the maximum stopping power which can be applied with the present apparatus is very small at exceedingly high speeds has not been duly appreciated; and although several progressive railroad men and the Westinghouse Air Brake Company have done some important and useful work in developing the "high speed" brake, yet the necessity for such a brake is not as generally understood as might be supposed from the public character of the experiments. In the *Railroad Gazette* of May 25 last, page 373, it was shown how the saving of a few feet in the length of the stop would reduce enormously the force of a collision, and the experiment with the "high speed" brake on the Pennsylvania Railroad * is a practical illustration of what can be had in the way of increased safety for fast trains by providing some sort of brake apparatus so designed as to make the stopping power more nearly constant at different speeds. The saving in the distance from the point where the brakes were applied to the point of full stop in the case of the Pennsylvania Railroad tests was considerable, and enough to warrant the construction and maintenance of special brake apparatus for important trains.

Probably a diagram like the one printed herewith shows more clearly the change in a series of results than a column of figures in a table. This diagram shows the change in the holding power of brake shoes at different speeds as determined by Galton and Westinghouse, and is practically the only data available at this time that is sufficiently reliable or complete to be used as a basis for the comparison of the holding power of brake shoes at different speeds. The curved line *A C* shows the reduction of the power availabe to stop trains with the present apparatus as the speed increases. The data for this was taken from the table in the preface of the Westinghouse Company's publication referred to above. The line *A B* indicates a uniform stopping power at all speeds, and that is what it is desirable to obtain in order to reduce the length of the stop to a minimum, and it is the object of the high-speed brakes to make the curved line *A C* coincide more nearly with the line *A B*. Probably this is impossible; and, so far as is known now, about all that can be done is to raise the point *C* so that the curve of braking power may be perhaps something like *A D*. Even the small increase of braking power shown by the line *A D* will make a great difference in the length of the stop. The reason for this is, that to reduce the velocity of a train work must be done upon it and the stored energy reduced. This is done in the case of brakes by the friction of the brake shoes, and the energy taken out is represented by the product of the friction of the shoes and the distance run. Thus, if the friction of the shoes be 1,000 lbs., and the train be run 100 ft., the stored energy of the train will be reduced by 100,000 foot pounds. At the higher speeds, the train runs a longer distance for a given reduction of speed than at slower speeds. The distance run in reducing the speed of a train from 100 to 50 miles an hour is much greater than that run during the remainder of the stop—that is, from 50 miles an hour to a standstill—and therefore a small increase in the braking power at high speed will reduce the length of the stop considerably.




The preface to the new publication of the Westinghouse-Galton experiments is very suggestive, and a comparison of the summary there given, with the expected results from the M. C. B. Laboratory Brake Shoe Tests Committee, cannot fail to be interesting. And if the committee's work corroborates the Westinghouse-Galton conclusions we shall then have a good foundation on which to base the next step in air brake service, namely, to provide adequate control for high-speed trains and to reduce the emergency stopping distance for a train running at 100 miles an hour to half a mile or less.

## Results of the M. C. B. Association Letter Ballot.

The results of the letter ballot ordered by the Master Car Builders' Association on standards and recommended practice are announced by the secretary under date of August 14. It appears that all recommendations for standards are adopted by ample majorities, as are all but two of the recommendations for practice; the two recommendations rejected being the ones concerning the diamond truck, the first advocating a wheel base of 5 feet 2 inches, and the second fixing dimensions for arch bars for trucks of 60,000 pounds capacity.

By this ballot the standard size of postal card circulars is fixed at 3¾ by 6 inches, the standard sizes of pamphlets and trade catalogues at 3½ by 6, 6 by 9 and 9 by 12 inches, and the standard size of specifications and letter paper at 8¼ by 10¾ inches. The reason for the adoption of the first is that it is the size most generally used. The second is adopted for the reason that the sizes mentioned can be folded with so little waste from stock paper, while the size embodied in the third recommendation can be properly cut from folio size, 17 by 22 inches. The recommendation of a standard practice of having the proper dimensions together with the word "Standard," printed on the upper left-hand corner of circulars, pamphlets, catalogues and specifications was also adopted. A careful adherence to the above standards will greatly simplify the task now somewhat difficult of keeping in order and classifying material of value which often speedily finds its way to the waste basket on account of inconvenient size.

The standard code of terms proposed by the committee

* The Pennsylvania experiment was reported in the *Railroad Gazette* of April 13 last, page 268. While the comparative trials were not worth much for record, on account of improper adjustment of apparatus and the presence of conditions, such as wet rails and irregular supply of sand, which could not be fairly estimated, there was no doubt of the main fact that the use of the pressure-release valve helped materially to shorten the stops. This appears from the paragraph near the bottom of page 269 in the article mentioned, where a saving of 23 per cent. in distance is shown.

on wheel and flange gages and adopted by letter ballot will facilitate reference to this subject. It is to be hoped that the maximum and minimum wheel flange gages proposed by the committee and adopted on letter ballot will come into universal use. The limit of $\frac{1}{16}$ in. either way from the standard thickness is not excessively small, though it is probably a fact that a good proportion of the cast-iron wheels now furnished to railroad companies would fail to pass the gages. It has been conclusively demonstrated that thick or thin flanges are dangerous and hard on the track. The Association has done well in confirming the action of the committee in this respect, as well as in the matter of the adoption of the combination wheel gage for mounting and inspecting wheels and the guard rail and frog wing gage, defining the dimensions of track to which the standard wheel and flange gages have been made to conform. It is not probable, however, that the last named gage will come into more extended use than when previously a standard of the Association, for the reason that the motive power departments as a rule have very little to say regarding the gage of track, width of throat of frog, and space between outer rail and guard rail. It can do no harm, however, to have in mind a standard to which the engineering department ought to conform and of which it might be well to remind the engineers occasionally.

The gage adopted for the inspection and mounting of wheels should be put in use at once. Entirely too much latitude has been allowed in mounting wheels. The present variation of ⅛ of an inch either way from the standard of 4 feet 5 ⅜ inches was intended, when adopted, to apply only to wheels already mounted, and not to new work. The report of the Pennsylvania Railroad Committee, a portion of which is included in the report of the Master Car Builders' Committee on wheel and flange gages, shows that out of 13,141 pairs of wheels measured, 187 were found to measure less than the prescribed minimum of 4 feet 5 inches. Nearly 4 per cent. of the cars measured would require one or more pairs of wheels remounted in order not to exceed the 4 feet 7 inch limit of the ordinary car inspector's gage, and 86 per cent. would require one or more axles remounted in order to be within the limit of 4 feet 6¾ inches proposed by the committee. The use of this gage will require more care in mounting wheels than has heretofore been exercised, and may be a source of some additional expense, but it can hardly fail to reduce the wear of track and wheel flanges, and in the long run the expense of maintenance.

The adoption of a standard height of 13 inches from the top of the rail to the centre of inside hung brake shoes, and 14½ inches to the centre of outside hung brake shoes, was adopted, but opposed by 25 per cent. of the votes cast It is not easy to see what objection could be raised to this standard, for the heights proposed were certainly not too great, although with some designs of trucks it would be difficult to get inside hung brake shoes so high as 13 inches. There are very few trucks of 60-inch wheel base that would permit of a higher position of the brake beam As for outside hung brake beams, 14½ inches is not so far from the centre line of the wheel as to cause trouble in unloading cars with the hand brake set.

As recommended practice the Association sustains the committee in the belief that steel tires should not be worn to a less thickness at any point than one-half an inch nor to a less thickness than 1 inch at any point within 4½ inches of the back of the flange. Also that a groove be cut in the outer face of each tire one-fourth of an inch from the limit of wear for that tire in order to facilitate inspection.

The Association also agrees with the committee in the adoption as recommended practice of a standard arrangement of safety chains for freight cars when safety chains are used. The design submitted by the committee is an improvement over the chains usually attached to freight cars, as they are of sufficient size to be of some use.

The recommendation of the Committee on Lubrication of Cars that the top of the wedge for 3¾x7 in. journals be rounded instead of rounding the top of the bearing, met with the approval of the Association. The committee considered the present construction of the box to be seriously defective in this particular, and considered the construction of the bearing for 4¼ x 8 in. journals greatly superior. The Association adopts, also, as recommended practice, the proposal of the committe that the gages submitted by them be used for both standard journal bearings and keys.

The modified form of dummy coupling hook with an enlargement at the point to prevent the wrong use of the hook, thereby injuring the gasket of the couple, which was proposed by the Committee on Air Brake and Hand Brake Apparatus, was adopted by the Association on letter ballot as recommended practice. The form of air brake repair card submitted by the committee was also adopted as recommended practice.

The report of the Committee on Freight Car Trucks was partially sustained by the Association on letter ballot. The committee recommended a 5-foot wheel base for diamond trucks and certain sizes for arch bars of 60,000-pound trucks. The first recommendation was changed in convention to 5 feet 2 inches, on account of the fact that 5 feet is too short a wheel base to get a good brake construction in all cases with inside hung brakes. Both propositions were voted down on letter ballot.

The suggestion made during the convention that there was an error in the standards of the Association in the distance of the steps of ladders from the sheathing, was considered by the executive committee after adjournment and ordered to be included in the subjects to be balloted upon. The vote resulted in a change from 3½ to 2½ inches.

### Rapid Transit in Boston.

The rapid transit situation in Boston, as it stands at this moment, is so complicated that we venture to say few people have had the time and patience to get a clear conception of it and we have thought that a summary of the provisions of the last Act and of its probable consequences would be of general interest.

The Rapid Transit Act recently passed by the Massachusetts Legislature for the city of Boston and accepted by a vote of the inhabitants of the city at a special election lately held for the purpose, consists of two distinct measures. The first twenty-two sections of the Act incorporate the Boston Elevated Railroad Company and the remaining seventeen sections enable the Boston Transit Commission to construct (a) four and two-track subways under Tremont and contiguous streets in the so-called congested district; (b) a bridge to Charlestown; (c) a tunnel to East Boston; (d) the acquirement of a right-of-way to Franklin Park for a possible elevated railroad.

The charter of the Boston Elevated Railway contemplates three elevated railroads (supposedly the Meigs system, but expressly not the "Manhattan system") running through the business district and connecting most of the suburbs with each other; the routes are specified in the Act, but may be changed by order of the mayor and aldermen and the selectmen of the cities and towns traversed by the several routes.

There is little possibility that this charter will be used for anything except for speculative purposes, as it will be difficult to get capital to invest in an experimental system of elevated roads which will necessitate the payment of enormous damages to abuttors, including half the cost of making a new street in the financial centre of the city; and also, as the company will be obliged to secure its right-of-way through the different sections by the approval of the city and town authorities, besides having to "run the gauntlet" of the Railroad Commissioners in reference to the kind of elevated structure to be used.

The subway sections of the Act contemplate railroad tracks for accommodating the surface and elevated systems through the congested district of the city; and the cost of the subways, the bridge, and the right-of-way to Franklin Park will be paid for by the city on the authority of the commission. The amount of $7,750,000 has been authorized for the above purposes, which must be increased if the amount of $750,000 is not found sufficient to build the bridge to Charlestown; but the appropriation does not include any expenditure for a tunnel to East Boston and its connection with the subways; the carrying out of this project will be dependent on future action by the City Council.

The commission will have the control of the moneys authorized which the city treasurer of Boston must supply by issue of bonds for the purpose, running forty years, with interest at not exceeding 4 per cent.

Taken all in all the Act means practically a subway system through the business section of the city which, however, will probably be made complete in the future but the adoption of elevated attachments in the outlying sections of the city by the action of succeeding legislatures.

The Rapid Transit Commission appointed to carry out the provisions of the Act consists of George G. Crocker, A. C. Burrage, C. H. Dalton, George F. Swain and T. J. Gargan. This commission was organized on August 14 by the selection of Hon. George G. Crocker as chairman. Mr. Crocker is well known, having long been the efficient Chairman of the Railroad Commission of the State.

The Secretary of the American Society of Civil Engineers has just sent out for letter-ballot several amendments to the constitution, the ballot to be canvassed October 3. One of these amendments is of quite unusual importance; that is the one which changes the method of electing the secretary. If the amendment prevails he will hereafter be elected by the Board of Direction. Such a radical change in the practice of the Society (which, by the way, appears to us extremely a desirable change) should not be made without a very full vote. We take the liberty, therefore, of calling the attention of the members to this matter, knowing man's proclivity to neglect his opportunities and his duty in the matter of voting.

We have published a number of complimentary letters sent by railroad managers to their emloyees, in connection with the recent strike disturbances, but it seems likely that there have been many which we have not heard of. We have just received a copy of one issued by Mr. J. J. Frey, general manager of the Atchison, Topeka & Santa Fé, dated July 19, and one issued by Mr. A. M. Tucker, general manager of the Erie lines west of Salamanca, dated August 1. These letters are in the same excellent tone as that of the letters already printed in the *Railroad Gazette*. Mr. Frey tells his men that "it is a source of genuine pleasure to realize that so large a majority of the employees are faithful," and that this faithfulness certainly will not be forgotten. Mr. Tucker sets forth in a very clear manner the seriousness of the responsibility that a railroad owes to passengers and shippers, and the utter foolishness of attempting to evade this responsibility. The men are warmly thanked for their "exertions in the time of peril and disorder, their refusal to listen of the solicitations of agitators and their watchfulness in protecting the property of the company." Mr. W. H. McDoel, vice-president of the Louisville, New Albany & Chicago, has also formally congratulated his men on their courage and fidelity.

## NEW PUBLICATIONS.

*Manual of Railroads of the United States for* 1894. New York: H. V. & H. W. Poor, 44 Broad street.

Poor's Manual for 1894, giving general and special statistics of the railroads of the United States for 1893, was issued last week. We gave on page 565 a few of the most important general statistics. The manual gives, besides the general statistics summarized in the introduction, statements of all the steam railroads in the United States and Canada, and the chief ones in Mexico, covering 1356 pages. These are followed by statements of the street railroad and traction companies in fifty-two chief cities of the United States, statements of the leading industrial corporations and organizations auxiliary to the railroad interest, a very full record (171 pages) of state and municipal indebtedness, and, finally, 103 pages are devoted to lists of officers of all the steam railroads of North America. Twenty double- page colored maps are introduced, covering the whole country, besides numerous uncolored maps of the individual railroad systems.

In the present volume the statements have been radically rearranged and now appear in geographical groups, except that the large "systems" extending through two or more groups are *not* included in the group sections, but are placed by themselves. Each section is preceded by a table showing a few of the principal statistics of each road in the group, *including* the "systems" whose statements are not printed with the group. This table is convenient for some purposes, though the groups are not the same as those of the Interstate Commerce Commission.

We do not need to say that the Manual is indispensable in every office where it is important to have specific information of the railroads of the United States. This is the twenty-seventh annual number of the Manual, and its merits are known all over the civilized world.

*The Journal of the Franklin Institute* for August contains a paper by Professor Thurston on the Graphics of the Efficiency of the Steam Engine, one by Mr. Clayton Beadle on New Cellulose Derivatives, and one by Mr. Arthur D. Little on Industrial Applications of Certain Cellulose Products. The valuable paper by Mr. Alfred R. Wolff on the Heating and Ventilation of Large Buildings, is concluded, and Professor Lanza's interesting lectures on Engineering Practice and Education are continued.

*Annual Report of the City Engineer* of the City of Providence.

We have received from Mr. J. Herbert Shedd, City Engineer, Providence, R. I., his annual report for the year 1893. It is of special interest to water-works engineers, because of the very careful and elaborate data of rainfall, the records going back to 1832. The details of new work and maintenance work for water supply, sewerage and drainage are also remarkably complete.

## TRADE CATALOGUES.

*Tinius Olsen & Co.*, 500 North Twelfth Street, Philadelphia, Pa., have lately issued a catalogue showing the design of some of the latest testing machinery and apparatus for ascertaining the quality of materials brought out by this firm. One of the more interesting of the various machines illustated is a new automatic and autographic testing machine. With this machine any stress applied to the specimen under test is automatically balanced on the scale beam and the machine itself draws a graphical record on a sheet of ruled paper, so that the operator at a single glance at the diagram can observe the results of the test. Other machines are shown adapted to a wide variety of purposes, among which are the testing of oil, yarn, textile material and cement. Various appliances are shown for the convenient and accurate measurement and inspection of material undergoing tests.

*The Petelier Portable Railway Manufacturing Co.*, of Minneapolis, Minn., has recently issued a new illustrated catalogue of its steam shovel cars and small cars for hand work. The company makes three standard sizes of side dump steam shovel cars of two, three and six yards capacity when level full. The cars are made with steel frames. The box is pivoted on three supports arranged on the center line of the car and the car tips to the side. The cars of smaller capacity are made for 36-in. gage, but can be readily changed to standard gage by placing the wheels outside of the frame, this, of course, requiring longer axles. The company makes, also, standard small cars for

hand work and these may be dumped either automatically or otherwise. The smaller cars are made for coal, ore, gravel or rock.

*General Supplies and Machinery for Railroads and Contractors.*

The Smith-Courtney Co., of Richmond, Va., issues under date of July, 1894, a very handsome catalogue covering supplies and machinery for railroads, contractors, machinists, miners, mills, etc. The catalogue contains 527 quarto pages, including an alphabetical index, and gives illustrations, prices, sizes, weights and other information of an immense variety of material. In fact, the Smith-Courtney Co. are Southern selling agents for some fifty or more of the best houses in the United States, and consequently it would be rather easier to say what the catalogue does not cover than what it does cover. It shows wood and iron-working machinery, engines and boilers, iron pipe fittings, valves and railroad contractors' supplies in great variety. The catalogue is one of the largest and most complete that has come to our attention.

*Multipolar Generators and Motors.* Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

The Westinghouse Co. issues a small pamphlet describing very briefly its line of multipolar generators and motors for isolated lighting and for general power service. These are furnished from three-quarters of a horse-power up.

## American Society of Civil Engineers.

The first meeting of the season of 1894-95 will be held on Wednesday evening, September 5, at 2 o'clock. A paper will be presented on

SOME NOTES ON HOT BATH TESTS FOR CEMENTS,

by Frederick H. Lewis and J. Edward Whitfield. The following is an abstract:

The authors state that all hot tests are discarded in the German standards for the reason that they have been found misleading. The German opinions upon this subject should be given great weight, because of their very thorough practical tests and from the fact that their cements will universally stand the hot tests; and that, therefore, their opinion may be taken as unbiased.

The writers have been making observations with hot tests for more than a year at the temperature of 180 degrees Fahr. in most cases The first impression from these tests is that they are convincing as to their value, as there is such a sharp contrast between those pats which come out sound from the test and those which show different grades of deterioration.

Experiments with lime have convinced the authors that free lime is somewhat of a "bug-a-boo." It is quite true that the addition of caustic lime in moderate proportion will produce swelling in pats placed in hot water baths; but if hard burned lime is ground to pass through a No. 74 sieve it soon ceases to be caustic; it rapidly takes up water from the air, and it is probable that in a week or ten days after grinding, the free lime contained in a cement has ceased to be caustic. Thoroughly hydrated lime is of no disadvantage to cement; on the contrary, the strongest sand mortars are made of mixtures of well-slacked lime and Portland cement. Thus a mortar of two-thirds Portland cement and one-third slacked lime, mixed with two parts sand, gave tensile strength of 423 pounds in seven days, and 583 pounds in twenty eight days. Pats of this mixture stood boiling tests perfectly, whether fresh or salt water was used. The mixture of very finely ground lime with cement is for the purpose of giving greater plasticity to the mortar.

Cements are made slow-setting at will by the addition of sulphate of lime, and such cements will in most cases stand boiling. Several brands of English and American Portland cements which would not stand boiling tests when received, did so when made slow-setting by the addition of lime. Not only is it true that they frequently can be made slow-setting, but they will carry through the hot test a considerable added percentage of lime.

A Portland cement, which would not boil satisfactorily, gave on a seven-day test an average strength of 464 pounds. It was then rendered slow-setting by adding 10 per cent. of quick lime as dry powder, and two briquettes were made from it. These swelled and developed cracks in the moulds, but after setting 24 hours they were put in hot water at 180 degrees Fahr. for 48 hours, when they gave respectively 460 and 500 pounds strength, with no further development of cracks.

In another case, cement which gave 488 pounds on seven-day tests had 3 per cent. of specially calcined quick lime added. The briquettes were hard and sound, and after 24 hours were put in hot water at 180 degrees Fahr., and kept there for 48 hours. They then gave 559 to 598 pounds per square inch strength. Another portion of this cement had 10 per cent. of such lime added, which had been ground fine and kept in a box for a week. Briquettes kept one day in air and six days in water gave 446 pounds to 506 pounds strength. When kept in water 48 hours they gave from 416 pounds to 421 pounds. There were a few small cracks on top, which did not change after two months' exposure in the air.

It is evident from these cases that hot-bath tests do not reveal the presence of free lime in such cements. The Germans reason evidently that a quick-setting cement will either be able to deal with its content of free lime in ordinary course, or else its failure to do so will be manifested in cold water after a lapse of a few days. As a test of free lime, the high-temperature bath has not commended itself to the writers. Some cements are quite disintegrated in the hot bath, and one or two have failed to be entirely satisfactory when made slow-setting. Analyses have showed these samples to contain high percentages of anhydrous sulphate of lime, which was burned with the cement.

French specifications limit this anhydrous sulphate, and there is an endeavor to keep it out of the product. While the hydrous sulphate which is added to cement after burning is not at all injurious in small percentages, the presumption is that anhydrous sulphate is, and the writers assume that very bad pats are due to anhydrous sulphate. So far the facts have confirmed this hypothesis, and a further investigation may lead to interesting results.

## A Brief Lecture to Station Agents.

The Chicago, Milwaukee & St. Paul has recently issued a revised book of rules and instructions for station agents, which seems to be very full and complete. The only objection to it that we have to mention is that which we have several times made in connection with train rule books—that it is too good a book mechanically. A book on heavy paper, in strong cloth or leather, has such a substantial appearance that it is regarded as a permanent institution, and necessary revisions in rules are likely to be postponed; while a cheaper affair, such as a freight tariff, will be thrown aside and a new one issued without so much hesitation over the cost. There are about 700 rules in this book, and every one of them would make a good subject for discussion if we were short of matter for the columns of the *Railroad Gazette;* but such a wealth of material is bewildering, and we will merely give the excellent introductory letter, signed by President Roswell Miller, which goes with the book to each agent.

*To the Agent:*

The object for which a railway exists is to secure freight and passenger traffic at remunerative rates, and to transport it with economy and dispatch. To obtain such results the traffic, operating and accounting departments have been created, and are mutually dependent. The station agent is the recognized representative of the traffic, operating and accounting departments, and is necessarily subject to the instructions of those in charge of the securing, handling and accounting for traffic. His services, according to their merit, will be duly recognized by all who are in authority.

You are the representative in your town of the Chicago, Milwaukee & St. Paul Railway Company, and through you the business of the company with its patrons is conducted. Your position is one of responsibility, since in the great majority of cases as much business is done over your counter as over that of any merchant in your town. You are engaged in selling a commodity—namely, transportation—and, like all merchants, business methods are necessary to your success. Whether your station be rge or small, your duties arduous or otherwise, such methods are equally necessary. You cannot succeed, nor do the company justice—especially if your station is competitive—unless you are active, industrious and courteous any more than a merchant can who lacks these qualities. If there be no competition at your station precisely the same qualities are neccessary for the same reasons, and because the company desires to treat those who cannot buy transportation of any other company precisely as well as it does those who can; for as an idle, thriftless or uncivil merchant invites the establishment of a rival store, so you may do much to convince the people of your town that they are better off with one good railway and one good agent than they would be with more.

The reasons for some of these rules may not be understood by your customers—perhaps you may not always understand them yourself, though you can ascertain them by inquiry. When you can explain the rules to patrons who may complain of them, you should do so; but the rules must be enforced pleasantly and firmly. You will perhaps have to deal with unreasonable people, but the great majority of shippers know by experience the value of system and order, and you should have little difficulty in satisfying them, and at the same time enforcing the rules of the company. If, however, such enforcement appears to affect the company's revenue or wrongly inconvenience patrons the attention of superintendent or division freight and passenger agent must be called to it at once.

The book of instructions herewith is for your guidance and assistance. It is the result of much study on the part of the officials who have compiled it, and is intended to cover all ordinary business which you are called upon to transact. If you meet with a case which, in your opinion, is not fully covered by any rule, refer it to your superintendent or division freight and passenger agent, but do not ask them till you are sure the case is not covered by any rule.

It is hoped that with this book at hand you will seldom be at a loss to know what to do in emergencies.

## RAILROAD LAW—NOTES OF DECISIONS.

### Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is ruled that it is no objection to the enforcement by the court of an order made against a railroad company by the interstate commerce commission, that the complainants before the commission have no real grievance, but are instigated by a competing railroad, since section 13 of the interstate commerce act expressly provides that no complaint shall be dismissed by the commission because of the absence of direct damage to the complainant, and since the commission has power of its own motion, to institute investigations, make orders, and apply to the courts for their enforcement.[1]

In the Supreme Court of Texas it is held that where a railroad passes into the management of trustees under authority conferred by a mortgage of the company's property and franchise, such trustees become the company's agents, and it will be liable for goods lost in transit over the road during the trustees' management. The statute under which said road was organized, and which authorizes it to raise money by sale of bonds secured by mortgage on its road and franchises, not being intended to empower it to surrender control of its road to others, and to relieve itself of its liabilities to the State and public.[2]

In Iowa it is held that a railroad cannot be convicted for any obstruction erected or maintained over or upon a highway during the time its business and property were in the hand of a receiver.[3]

In Texas it is ruled by the Supreme Court that even if it should be conceded that on failure of a railroad company to construct ten miles of road within two years of it incorporation, whereby it forfeits its charter, all rights in the roadbed are forfeited, a new company cannot, by simply taking out a charter calling for the same termini as the old company, acquire title to such property.[4]

In Mississippi the Supreme Court rules that a railroad operating a telegraph line for its trains, and not for profit, is not a "telegraph company operating * * * miles of wire," and therefore subject to taxation, as such, under the Act of 1888.[5]

The Supreme Court of New York rules that where a railroad mortgage recites that the covenants therein contained shall inure to the benefit of the successive holders of the bonds it is given to secure, the first taker of the bonds, which are negotiable in form, is powerless to enter into any agreement with the railroad company or its officers abrogating the mortgage covenants, so as to bind a subsequent purchaser of the bonds for value before maturity; and such a purchaser has the right to look to the mortgage, which is a matter of public record, with full assurance that the conditions contained therein will be enforced for his benefit.[6]

In Pennsylvania the Supreme Court holds that under a contract for railroad construction work, making the decision of the chief engineer conclusive as to any dispute between the parties, and providing that such decision shall be in the nature of an award, it is not necessary that the engineer's written decision be also signed by him before it becomes binding on the parties.[7]

The Federal Court decides that where a railroad ships goods from the State to its station in G. city, free cartage by the company to the business section of the city, for delivery to the consignees, is a violation of the long and short haul clause of the interstate commerce act, when the same freight rates are charged to merchants of the city of I., through which the road passes to reach G., but where such merchants are obliged to cart their goods from the station to their storehouses at their own expense.[8]

### Injuries to Passengers, Employees and Strangers.

In Texas a passenger was carried half a mile past his station on a dark and damp night. The conductor told him it was a short distance back, but that he could go on to the next station, whence, however, he could not return till the next day. The conductor refused to back the train to the station, saying that he was behind time. The passenger was unwell, but failed to tell the conductor so.

The Supreme Court holds that the passenger could recover for the exposure, fatigue, and mental distress caused by his walk back to the station[9].

In the Federal Court it is ruled that where a conductor uses unnecessary force in ejecting a passenger supposed to be personating the owner of a mileage ticket, the fact that the company has issued instructions to its conductors that regulations regarding such tickets must be strictly enforced, without fear or favor, and that, "if they find mileage tickets have been transferred, they must lift such tickets, collect full fare, ad report the transaction," does not render the company responsible for the wanton act of the conductor.[10]

In Kentucky it is decided that where a passenger could have purchased a round-trip ticket at the station where he took the train, the fact that there was no ticket station at his point of destination, thus preventing him from buying a ticket home, does not excuse his refusal to pay the extra 25 cents.[11]

In Pennsylvania the Supreme Court holds that the condition of a "special excursion ticket," that for the return journey it should be stamped by the ticket agent, was not waived by the carrier, either by the fact that the gateman permitted the passenger to pass through the gate without examining and punching the ticket, or by the fact that the sleeping car conductor failed to notice that the ticket was unstamped, where the regular passenger conductor noticed that the ticket was unstamped as soon as he received it, and so informed the passenger.[12]

The Supreme Court of Georgia rules that an agent who sells a Sunday excursion ticket, which does not indicate any particular train on which to return, is a proper person of whom to inquire, at the time the ticket is purchased, as to whether it would afford the right to return on a certain fast train, and his reply in the affirmative, together with the possession of the return part of the ticket, and its production to the conductor of the fast train, would entitle the passenger to return on that train, and be put off at he proper station, unless he knew, or had reason to believe, that the agent was misinforming him, or that there was some rule or order of the company denying to the agent authority to answer such a question, or forbidding the recognition of such a ticket by the conductor of the fast train.[13]

In Texas in an action to recover for personal injuries sustained by being struck by a locomotive at a crossing, plaintiff testified that a few minutes before he was injured, he crossed the same track and looked and listened for trains, and saw one about 250 yards from the crossing heading toward it, but standing still; that on recrossing the track at which time he was injured he listened for trains, but did not look, though there was nothing to obstruct his view, and he knew a strong wind was blowing from a point which would tend to prevent his hearing noise from the direction in which he had only a few minutes before seen a train headed. The Supreme Court holds that the plaintiff was guilty of contributory negligence.[14]

In the Federal Court plaintiff, an adult, while walking for his own convenience in defendant's private railroad yard, to avoid an approaching train, stepped on an adjoining track, whence any object approaching from the rear could be seen for at least 1,000 feet. He failed to look behind him, and, after proceeding about 300 feet, was struck by an engine, the bell of which was not ringing, as required by a city ordinance. Walking upon the tracks in the yard by strangers was forbidden by statute, but persons did so daily without interference. The Court holds that plaintiff was guilty of contributory negligence.[15]

In Massachusetts it is laid down that it is not gross negligence, as a matter of law, for a person who is familiar with a certain railroad crossing, and the time trains are due to pass it, to attempt to drive over it about train time, without looking to see whether the train is approaching, but such fact is to be considered by the jury with all the other circumstances in determining whether such person is guilty of gross negligence.[16]

In Oregon the Supreme Court rules that the mere fact that a train which caused an injury to a person on the track was running at a speed prohibited by an ordinance, which merely prescribed a penalty for its violation, is not per se, conclusive proof of negligence, rendering the railroad company liable, but such violation must have been the proximate cause of the injury; and whether the company is liable is for the jury, and not the court to say.[17]

The Supreme Court of Nebraska rules that outside of cities, villages and towns, negligence cannot be imputed to a railroad company solely by reason of the speed of its train, however great.[18]

In the same State it is held that where a child goes upon a railroad track in consequence of the failure of the railroad company to fence the same as required by statute, and is killed by an engine, the parents of the child exercising at the time ordinary care in the premises, the railroad company is liable.[19]

The question as to who are "fellow servants" has been before several Courts. The following are held not to be fellow servants, viz: a locomotive engineer and the trainmen on another train on the same road.[20] A locomotive engineer and a fence builder.[21] A train despatcher and a locomotive engineer.[22] A division superintendent and an employee on a work train.[23] A conductor and a brakeman on the same train.[24] The conductor and a signal operator and a section hand.[25]

On the other hand the following are held to be "fellow servants," viz: a section man and the foreman of the gang.[26] Trackmen and trainmen on the same road.[27] A section hand on a hand car going to his place of work to

aid in repairing the railroad, and the conductor and engineer of a working train also engaged in repairing the road.[28] The engineer and fireman of a locomotive and a common laborer, all engaged in moving cars on a spur track.[29] An assistant fireman of one train and the conductor of another on the same line.[30] A car inspector and car repairers.[31]

In Pennsylvania it appears that deceased was an engineer on defendants road, which was blocked by snow; that a train was sent out, which consisted of four engines and two tool cars, and carried two hundred laborers with appliances for clearing tracks; that an engineer, a conductor, and deceased's fireman each had been notified to go out "to open the road," "to clear snow," or "with the snow train;" that the men in charge of the train consulted as to the order of the engines; and that deceased was killed by his engine being thrown from the track. The Supreme Court rules that it was not necessary for the company to notifiy the trainmen where the drifts were and it is not liable for the death.[32]

In Virginia the conductor of a freight train contrary to the rules allowed certain cars to be shifted and run down grade without an engine attached. Subsequently, while the conductor was between said cars, a brakeman, without objection from the conductor, caused another car to run down in the same way, which, by reason of defective brakes could not be controlled, and struck the first cars with such violence that the conductor was injured. The Supreme Court rules that there was no cause of action against the company.[33]

In Indiana, a yard brakeman, having been furnished with a defective lantern, complained of it several times, and was assured that he should have a new one. The jury found that the danger of coupling cars with such a lantern was apparent and continuous, and that the lantern had gone out each day that the brakeman had used it. The Supreme Court holds that he had assumed the risk, and could not recover for injuries received by reason of its going out while he was making a coupling.[34]

[1] I. C. Commission v. D., G. H. & M., 57 Fed. Rep., 1005.
[2] Rio Grande R. Co. v. Cross (Tex. Civ. App.), 23 S. W. Rep., 529.
[3] State v. M. & St. L., 56 N. W. Rep., 400.
[4] S. S. & Mt. P. v. St. Louis A. & T. 23 S. W. Rep., 1012.
[5] Adams v. L. N. O. & T., 13 South Rep., 932.
[6] Belden v. Burke, 25 N. Y. S., 601.
[7] Malone v. P. & R., 27 A. O. Rep., 756.
[8] Interstate Com. Com. v. D., G. H. & M., 57 Fed. Rep., 1005.
[9] T. & P. v. Mansell, 23 S. W. Rep., 549.
[10] P., C., C. & St. L. v. Russ, 57 Fed. Rep., 822.
[11] Snellbaker v. P., T. & A., 23 S. W. Rep., 509.
[12] Bowers v. Penn. Co., 27 Atl. Rep., 893.
[13] Cen. R. Co. v. Roberts, 18 S. E. Rep., 315.
[14] G., C. & S. F. Ry. Co. v. Moss, 23 S. w. Rep., 475.
[15] M. P. Ry. Co. v. Mosely, 57 Fed. Rep., 921.
[16] Manley v. B. & M., 34 N. E. Rep., 951.
[17] Beck v. P. & V., (Or.), 34 Pac. Rep., 753.
[18] C. B. & Q. v. Grablin, 56 N. W. Rep, 796.
[19] C. B. & Q. v. Grablin, 56 N. W. Rep., 796.
[20] L. & N. v. Rames, 23 S. W. Rep., 505 (Ky.)
[21] L. E. & St. L. v. Hawthorne, 35 N. E. Rep., 534 (Ill.)
[22] L. R. & M. v. Barry, 23 S. W., 1097 (Ark.)
[23] G. H. & S. R. Co. v. Arispe, 23 S. W. Rep., 928 (Tex.)
[24] Woolen v. R. Co., 25 N. Y. (Supt.) 977.
[25] Haney v. P. C. & St. L. 18 S. E. Rep., 748 (W. Va.)
[26] A. T. & S. F. v. Martin, 34 Pac. Rep., 536 (N. M.); Griffiths v. N. J. & N. Y. 25 N. Y. (Supt.) 812.
[27] Schaoble v. L. S. & M. S. 56 N. W. Rep., 565 (Mich.)
[28] A. T. & S. F. v. Martin, 34 Pac. Rep., 536 (N. M.)
[29] Watts v. Hart, 34 Pac. Rep., 423 (Wash.)
[30] Jenkins v. R. & D., 18 S. E. 182 (S. C.)
[31] Fordyce v. Briney, 24 S. W. Rep., 250 (Ark.)
[32] Deer v. L. V., 27 Atl. Rep., 1002.
[33] R. & D. v. Dudley, 18 S. E. Rep., 274.
[34] Ind. U. Ry. v. Ott, 35 N. E. Rep., 517.

## Foreign Railroad Notes.

Since May 1 last the running of freight trains on Sunday has ceased almost entirely on the Prussian State Railroads, only express freight and live-stock being carried on that day. As a rule, freight is not to be delivered on Saturday for shipment.

The Gotthard Railroad is having built some third-class cars of the American style which will seat 80 passengers. They will be 59 ft. long from buffer to buffer and will weigh about 55,000 lbs. They will be lighted by gas and provided with the Westinghouse quick-acting brake.

The Commission which has charge of the construction of the Siberian Railroad has a sub-committee on churches. There are scarcely any people on many parts of the route, and in some places the natives are pagans or Mohamedans, and as the chief use of the road will be to colonize the waste places, it is necessary to make the vicinity of the road habitable to good Russians. The committee has reported in favor of buildings which shall serve at once as churches and school-houses at the stations. A very moderate beginning is made by the appropriation of $5,750 for this purpose.

## TECHNICAL.

### Manufacturing and Business.

The Ohio Railway Folder Case and Distributing Co., of Cleveland, has been incorporated in Ohio to distribute advertising matter for railroads.

The Craig-Reynolds Co. has recently completed the erection of a set of crossing gates at Matoon, Ill. The set protects two crossings on the Cleveland, Cincinnati, Chicago & St. Louis Railroad, and the gates are all operated from one tower-house by one man.

Brodhead & Hickey, railroad contractors, of Fairview, N. J. (now in liquidation owing to the death of D. C. Hickey), are offering for sale a railroad contractors' plant, consisting of three Rand Duplex Air Compressors, six hoisting engines, forty-two Ingersoll and Rand drills, about five miles of light rails, and some narrow-gage locomotives and cars, and other tools and appliances.

The C. W. Hunt Co.'s conveyor handles 395 tons of coal daily (in ten hours) at the Ninth and Wallace Street locomotive coaling station of the Philadelphia & Reading Railroad, in Philadelphia. About 125 locomotives are supplied daily, and they also take sand and water and dump ashes. The sand and ashes are also carried by one of the Hunt conveyors. The coal is delivered through revolving chutes, which measure a certain amount of coal at each revolution.

At a recent meeting of the Rowell-Potter Safety Stop Co. at Portland, Me., the following were elected directors: B. C. Rowell, George H. Bliss, Thomas Potter, F. M. Brinckerhoff, Alexander Chandler, B. F. Hathaway and W. E. Potter. At a subsequent meeting held at the headquarters of the company, 2 Exchange place, Jersey City, N. J., these officers were elected: President and Treasurer, Thomas Potter; Vice-President, Alexander Chandler; Secretary, W. E. Potter, and General Manager, B. C. Rowell.

The Giffen Railroad Lock Check Co., limited, has been organized at Houtzdale, Pa., to manufacture J. E. Giffen's device for the prevention of runaways on railroads. The machine locks on to the rail so that when a car runs against it it is derailed. The office of the company will be at Wallaceton, Pa.

The American Patent Car Truck Co. has been incorporated in New York to manufacture car trucks and car frame attachments. The directors are: W. H. Stevenson, of Bridgeport, Conn.; D. N. Maxon, of Brooklyn; J. B. Waring, of Roseville, N. J.; B. D. Penfield, W. L. Goldborough, J. C. Chapin, and William A. Pollock, of New York City.

The Morgan Engineering Co., of Alliance, O., has an order from the Carnegie Steel Co. for three of its patented electric overhead traveling charging cranes, for the purpose of charging and drawing ingots in the vertical heating furnaces at the Edgar Thomson Steel Works. About a year ago the Morgan Co. erected a crane of a similar character at this works, which has been so satisfactory that the firm has determined to change its horizontal heating furnaces to those of the vertical type, and is putting in these three additional charging cranes to handle the entire product of the blooming mill in connection with the rail mills. A 10-ton crane of 60 ft. span is being built for the foundry of this company, making in all 22 Morgan electric cranes in the plant. Two overhead traveling charging cranes, similar to those building for the Carnegie Co., have been ordered by the Ohio Steel Co., of Youngstown, O., in addition to a crane of 15 tons capacity, 75 ft. span, recently placed. Among other recent orders for cranes may be noted a 15-ton 50-ft. span traveling crane for the Laidlaw-Dunn-Gordon Co., Cincinnati; a 5-ton, 50-ft. span, and a 3-ton locomotive type crane (both operated by electric motors) for the American Machine Co., Pawtucket, R. I.; one of 20 tons, 70-ft. span, and one of 40 tons, 40-ft. span, for Mackintosh, Hemphill & Co., Pittsburg, making in all seven traveling cranes furnished that company. A 5-ton traveling crane of 30-ft. span is building for the Youngstown Steel Co.; one of 25 tons, 58-ft. span, for the Standard Steel Works, Burnham, Pa., and the company is erecting two specially constructed patented traveling cranes for handling blooms in and out of horizontal heating furnaces for Jones & Laughlins, Pittsburg, in addition to two electric traveling tables for serving their blooming mill. Two traveling tables, operated by electric power, for the blooming mill of Cambria Iron Co., Johnstown, Pa., will soon be shipped. Recent shipments include a traveling crane of 30 tons capacity, 75-ft. span, fitted with double trolleys, to the American Steel Foundry Co., St. Louis; one 20-ton crane supplied with a patented auxiliary hoist, to the United Verde Copper Co., Granite Station, Ariz.; one 25-ton, 55 ft. span, traveling crane to the Johnson Co., Johnstown, Pa.; this being the second furnished the company. It is stated, and we believe quite truly, that the Morgan Engineering Co. makes application of electric motors to more machinery of this class than any concern in this country. In addition to crane work it also makes large quantities of hydraulic and steam machinery.

### Iron and Steel.

The Riverside Tube Works at Wheeling, W. Va., and the Wheeling Steel plant have resumed operations.

The Bay State Iron Works, of Erie, Pa., have received an order from Spain for a number of boilers and engines.

The Ashland Iron & Steel Co., of Ashland, Wis., will resume operations at its charcoal furnace on September 1.

The Pittsburgh Bridge Co. is building an addition to the casting plant of the Midvale Steel Co., of Nicetown, Philadelphia.

The Edgar Thomson Steel Works, of Braddock, which started up last week, after a long shut-down, made one of the largest week's runs since the plant was built. An average of 1,600 tons of steel rails was made daily.

The Colorado Fuel & Iron Company resumed work last week in the rail department. The company has orders on hand to run the works at least six months. The mill will run full capacity and will give employment to over 900 men. The works were shut down on account of strike and inability to get coal.

No. 5 mill and No. 4 lapweld furnace, of the Reading Iron Co., of Reading, Pa., have resumed operations. All departments of the company are now running full-hand, over 600 men being employed. At Birdsboro nine double furnaces in the puddle department of the Brooke Iron Co. works have been lighted, giving employment to about 125 men. This plant has been idle for eight months.

### New Stations and Shops.

The Central of New Jersey will erect a stone station at Smith street, Elizabeth, N. J.

The Louisville, Evansville & St. Louis is enlarging its terminal facilities at East St. Louis, and plans have been prepared for a passenger and freight station at the Broadway viaduct. The building will be 40 feet by 200 feet, and part of it will be two stories high.

### The Campania's New Record.

The Cunard steamship Campania has made a new record for the western passage from Daunt's Rock, Queenstown, to Sandy Hook, having steamed the distance of 2,783 knots in 5 days 9 hours 29 minutes. Her daily runs were 516, 528, 543 525, 545 and 126 knots, or an average run of 510.93 knots a day of 24 hours. Her best daily run was 545 knots in 24 hours 51 minutes, an average speed of 21.13 knots per hour of 60 minutes. The fact that the Campania has broken the record and reduced it by 3 hours 18 minutes is not due to an increase in her speed, but to having taken a short course. She has made a better daily run, having on July 18, on her eastward trip, made 528 knots, which is equivalent to 565 knots westward, or 22.78 knots an hour of 60 minutes.

The Lucania has to her credit an average run per hour of 21.89 knots, which, if maintained throughout the course followed by Campania on this trip, would have made the passage in 5 days 7 hours 8 minutes, or 2 hours 21 minutes better than the Campania. The Campania now holds the records for the quickest eastward passage, made in October, 1893, in 5 days 12 hours 7 minutes; the best westward passage 5 days 9 hours 29 minutes made August 12-17, 1894, and the best daily run of 528 knots eastward made July 18, 1894, leaving the Lucania the record for the best average day's run for the whole trip, 21.89 knots a day. The Campania's bottom was scraped before she started, and she carried a full head of 165 pounds of steam all the way across. Her engines were run to their limit throughout the passage, except for two hours, when they were slowed on account of a fog. Her hourly average for the passage was 21.49 knots. The best thing about the Campania's recent passage is that she arrived at Quarantine before sundown, which enabled her to be inspected and to proceed to her dock on Friday evening. This is the first instance that a steamship leaving Queenstown on a Saturday has landed her passengers in New York on the following Friday.

### Interlocking.

The Johnson Railroad Signal Company has contracted to erect an interlocking signal plant at Readville, Mass., on the New York, New Haven & Hartford. The machine will have spaces for seventy-six levers.

The National Switch & Signal Company has been awarded the contract for installing an interlocking plant at Springfield Junction, N. Y., for the Long Island R. R. Also an interlocking plant at Philadelphia for the Philadelphia & Reading, and one for the Lehigh & Hudson. Some station and facing point signals are being made for the Delaware, Susquehanna & Schuylkill.

### The Pennsylvania Steel Company.

At a meeting of the organization committee of the Pennsylvania Steel Co. and the Maryland Steel Co., held in Philadelphia last month, Mr. Morris, the chairman, announced that the judicial plan of reorganization had been agreed upon, and over 90 per cent. of the creditors had assented, and sufficient preferred stock had been subscribed to warrant the committee in declaring the plan for judicial sale to be effective. Within a week the committee has decided to adopt this course. The time for subscription to the preferred stock is extended to Oct. 1. Stockholders who do not avail themselves of this opportunity will lose their holdings, as the common stock will be wiped out and the reorganization will be made for the benefit of the creditors and subscribers to the preferred stock.

### The Mason Air Signal.

The train signal apparatus of the Mason Air Brake & Signal Co. has been in use on one train of the Chicago, Milwaukee & St. Paul for the last two years, and the record made is considered a most satisfactory one. The train is composed of four cars, and these cars and the same locomotive have run together between Chicago and Elgin one round trip seven days in the week for the above mentioned length of time. The distance is 40 miles each way and there are 18 stops. The cost of repairs to the entire signaling apparatus during the two years has been 15 cents. This is what was charged for a rubber gasket and the time putting the same in place. The engineer and conductor report that there has been no failure of operation of signals during the two years.

### Westinghouse Brakes in the Australian Colonies.

The table below gives a statement up to about the first of June of the Westinghouse air brake equipment ordered for the various Australian colonies. The New South Wales order for freight car brakes is now in course of execution and probably about half of the 5,000 sets have been mounted. Of the passenger cars in that colony a portion of the 3,110 hve been provided only with pipe connections and not with complete brake apparatus.

| | Engines. | Passenger Cars. | Freight Cars. |
|---|---|---|---|
| Victoria | 615 | 1,164 | 6,000 |
| New South Wales | 574 | 3,110 | 5,000 |
| South Australia | 97 | 178 | |
| Queensland | 35 | 200 | |

### Canadian Canal at Sault Ste. Marie.

The Dominion Government will take over the "Soo" Canal from the contractors next month. It has not yet been decided whether or not the canal will be made free. During their visit to the "Soo" Canal last week the Minister and Deputy Minister of Railways and Canals

made a thorough inspection of the work, and found it in the final stage of completion. The operating machinery for the gates and valves is being made at the Kingston Locomotive Works, and has not yet been delivered, but with this exception the plant is pretty much all in position.

### Test of a Brick Arch.

This test was made in connection with the construction of a service-reservoir at Beaune, which is to be covered by brick arches of 13 ft. 1½ in. span and 1 ft. 11⅝ in. rise (three-twentieths of the span). They are composed of two rings of brick 11.8 in. by 5.1 in. by 1.2 in. laid flat, with a bed of cement mortar between the rings 0.4 in. thick, and a layer of cement mortar 0.8 in. thick on the outside. The mortar is made from 9 cwt. of Vicat cement to a cubic yard of sand. A section of such an arch, two feet wide, was made, with solid abutments, in a rock cutting, and tested with a load of sacks uniformly distributed. The load amounted to 820 lbs. per square foot, and remained on the arch eighteen hours without any crack or settlement being observable. The test took place six days after the arch was built and three days after the centre had been removed.—*Abstracts of Papers, Inst. C. E.*

### An Electric Brake.

An electric brake, which is being promoted by the St. Louis Electric Brake Co. has been in use on a car of the Suburban Railroad, of St. Louis, for several months, and seems to be satisfactory. The principle of it is a hollow magnet, made of coiled copper wire; in the middle, and free to move lengthwise, are two pieces of soft iron, the opposite ends of which are connected with the brake levers. When the current of electricity passes through the coiled wire, the two soft iron cores are moved toward each other and the brakes are applied. It is claimed that the brakes may be applied with full force at first, and let off gradually as the car stops. The officers of the company are: W. V. Wolcott, president; J. L. Black, vice-president, Samuel Resh, secretary and treasurer. Mr. Resh is air brake instructor on the Missouri Pacific.

### The Pohle Air Lift Pump.

We are authorized to announce that the manufacture and sale of the Pohlé Air Lift Pump has been taken up by the Ingersoll-Sergeant Drill Co. This company has made a special department of its business for the introduction of this pump, under the direct supervision of Dr. Pohlé, the inventor. The apparatus was described in our issue of November 10, 1893. It consists essentially of two pipes, one to carry compressed air to the bottom of the well, or other reservoir of water to be lifted, and the other to carry the water up. Any mechanism for compressing and storing air may be used. The compressed air is delivered at the lower end of the immersed water pipe and the water is lifted by the buoyancy of the air, which acts also on the principle of the ejector. The height to which the water can be raised depends upon the specific gravity of the aerated column of water and the energy of the jet acting at the foot of the column. It is found that the best results are got by admitting the air in large bubbles, filling the cross section of the pipe and forming little, piston-like columns, which alternate with columns of water. As the apparatus has no valves or other mechanism to clog or corrode, it is applicable to many other purposes than lifting water. Sticks, mud, stone and sand, intermixed with water, are successfully raised, and it is serviceable in handling acids, alkaline substances and other fluids and semi-fluids. This pump has been before the public about two years, and in that time over 100 plants have been installed, and there is an increasing demand for it, indicating the success with which it has been usd. Testimonials from many users speak highly of it.

### The Illinois Central Suburban Express Service.

The suburban express service of the Illinois Central Railroad Company, in Chicago, has recently been extended, the northern terminus having been removed from Van Buren street, where it has been located ever since the institution of the express service at the opening of the World's Fair, to the regular suburban terminal, at Randolph street. Cross-overs have been put in south of Van Buren street, leading from the express tracks to the regular suburban tracks, which are now used by all suburban trains between Van Buren and Randolph streets. This change does away with the necessity for the viaduct at Van Buren street, which it is proposed to remove. No stops are made by these trains between Van Buren street and Hyde Park. An interesting feature of the present service is the adoption of station platforms on a level with the car floor at nearly all stations. The car steps are covered with a hinged platform, which can be folded out of the way when stops are made at stations not provided with the elevated platforms.

### Cinder Pits.

We have received from Mr. Walter G. Berg, principal assistant engineer Lehigh Valley Railroad, Jersey City, N. J., the following circular issued by a committee of the Association of Railroad Bridge Superintendents, of which he is chairman. The circular explains itself, and we publish it in the hope that some engineers, who do not receive it in the regular routine, will be prompted to send to Mr. Berg replies to the questions. The other members of his committee are A. S. Markley, Pittsburgh & Western, Allegheny, Pa.; G. W. Andrews, Baltimore & Ohio, Philadelphia, Pa., and R. M. Peck, Missouri Pacific, Pacific, Mo. The circular follows:—

What system for dumping and removing ashes from locomotives is in use on your road? Give general description and the location, whether in a main track, side track or special track.

If a pit is used, give depth, clear width and length, and describe in general the kind of foundation, materials in side wall and bottom of pit, coping, rail fastenings or supports, drainage, and the methods used to protect against heat.

If a conveyor system, elevated platform with dumping trestle, or other method in use, describe same, giving principal dimensions, materials and details.

What is the arrangement, location and height of ash car track in relation to the pit or dumping track?

What kind of coal is used? Does the choice or dimensions of a cinder-pit system depend to a certain extent on the kind of coal used, and, if so, in what respect?

It is particularly desired to obtain first cost of cinder-pits or other systems for removing ashes; also the unit cost of operation (i. e., handling the ashes from pits to cars); and the output capacity of a pit or plant of given size.

We are especially desirous of obtaining blue prints of cinder-pit systems in actual use on your railroad, with such remarks as you may feel willing to make on the efficiency of the design, the reasons for its adoption, and any possible improvements you might have to suggest or general views to offer on the subject of the best system to recommend under stated conditions.

### The Webb & Thomson Train Staff.

The Webb & Thomson apparatus for operating single track railroads with a train staff, is to be placed in operation on the Chesapeake & Ohio, that company having given an order for instruments to be located at each end of the Lewis tunnel. The apparatus is to be put in by the Johnson Railroad Signal Co., which controls the sale of this device in the United States. It will be remembered that two of these machines have been in use for several months on the Chicago, Milwaukee & St. Paul, at Savanna, Ill.

### The Mullan Tunnel.

It appears that the press despatch published last week, about the fall of a part of the roof of the Mullan Tunnel, Northern Pacific Railroad, was much exaggerated. We have received the following official statement:

For the past two years the company has prosecuted the work of removing the old timbering, replacing it by a permanent lining, using concrete side walls and brick arch. In the progress of this work it is almost impossible to avoid minor detentions to trains. In this particular case, progress through the tunnel was delayed about 24 hours, the trains being sent around by an alternative route. The accident was too slight for the engineer in charge at the tunnel to report particulars. The material is cyanite, which at some points is very loose and much decomposed. The company has had several serious accidents in the past, but a recurrence is not anticipated, as all the dangerous sections are now permanently lined.

### A New Steel Foundry.

The American Steel Foundry Company is just completing a steel casting plant which, it is said, will be one of the most complete plants of the kind in this country. The plant is located at Granite City, about five miles out from St. Louis, on the Illinois side of the river, and is reached by the Wabash, the Cleveland, Cincinnati, Chicago & St. Louis and the Chicago & Alton roads. The buildings are completed and the machinery is now being installed. The company is under contract to deliver castings by September 15 this year. The main casting floor is 79x250 feet and there are two wings, one 60x250 feet and the other 40x360 feet. The loading platform, a stone structure, is 400x40 feet. There are also a gas plant and other necessary buildings. There will be a double battery of John O'Brien boilers and 400 h. p. Rankine & Fritch engine. The electric lighting plant will be of sufficient capacity to light the casting plant and to furnish light to Granite City. The melting capacity of the foundry will be 100 tons in twelve hours. Over the main casting floor will be operated the 30-ton cranes that did service in the Machinery Hall at the World's Columbian Exposition last year.

The plant is being erected principally for the manufacture of the Schaffer cast-steel truck; this is the same truck that is now being manufactured by the American Steel Casting Company. It has been illustrated in *Railroad Gazette.* Mr. Edw. F. Goltra, who, with Mr. Schaffer, of the Missouri Pacific, was patentee of the truck, is vice-president and manager of the new company, and Mr. Rollo Wells is president.

## THE SCRAP HEAP.

### Notes.

The machine shops of the Road Department of the Boston & Maine at Salem, Mass., were burned on Aug. 19. Loss about $50,000.

Nine locomotive firemen of the Long Island Railroad have been arrested at Long Island City, N. Y., for violating the city ordinance prohibiting the use of soft coal.

The Coroner's jury investigating the railroad disaster at Lincoln, Neb., Aug. 9, finds that the train was maliciously derailed, and recommends that G. W. Davis, the colored man arrested, be held for examination on the charge of maliciously tampering with the rails. The latest reports indicate that the number of persons killed is less than 24.

The Receiver of the Oregon Railway & Navigation Co. has ordered a reduction in wages in the cases of employees drawing over $100 a month of 12½ per cent., and for all drawing over $50, to and including $100, 10 per cent. The reduction applies to all employees of the operating department, except the trainmen, for whom a new schedule will probably be made.

The Receiver of the Denver, Leadville & Gunnison, who has just taken charge of the road, has reduced the wages of most of the men, notifying them that the only alternative will be to stop running trains. There have been reductions also on the Union Pacific, Denver & Gulf, which is operated by the same receiver. The station agents, who have had their salaries reduced, are now paid in part by commissions on the sale of tickets.

### Took His Trinkets with Him.

The business men and every other citizen, both great and small, in the little city of Albany, Ind., have instituted a boycott on the Lake Erie & Western Railway. East Albany is a new addition to the town, located a mile from the original place, with a creek between the two. It is alleged that the railroad company is financially interested in the new town, and recently a new depot was erected there. It was believed that trains would stop at both stations until a few days since the Albany agent took his ticket stamper and other trinkets, leaving the Albany depot empty, and went to the new town in the country. Now the passengers are carried right past their homes, one mile across the creek and dumped off in the woods. Freight is treated in a like manner, and the Western Union office is likewise removed. A hack line to Muncie will be established next week, and all freight will be delivered from that city in wagons, and in the meantime the Panhandle is considering an offer of $40,000 from the Albanyites to build a branch from Dunkirk, about ten miles. The idea is to build the road on to Muncie and thence to New Castle and there connect with another branch of the road.—*Exchange.*

### A Salt Lake Romance.

There is a quaint superstition in the minds of nearly all Union Pacific employees in train, engine and yard service, in regard to the significance of water marks in the paper on which official letters are issued. The paper is manufactured by Crane Brothers, and their water mark is a crane. It is the position of this bird in the letter that the boys attach significance to. If it stands erect, the wording of the letter has no bearing on the status of the holder. He would be reemployed anywhere on the road, regardless of the fact that the letter might state that he had been discharged for the rankest sins that a railroad man could be guilty of. On the other hand, if the bird happens to be upside down, no matter how much the head of the department may have certified to the good character and capability of the holder, the prevalent belief among the boys is that he could not get a job. So, when a man leaves the service and obtains a "service letter," his first act is to hold it up to the light to note the position of the bird: If it stands erect he has no complaint to make; if inverted, he roars.—*Salt Lake Tribune.*

### The New Tunnel of the London & Northwestern.

The traffic on the London & Northwestern Co.'s section from Manchester to Leeds was, on August 5, for the first time, passed through the new tunnel under Standedge, a lofty portion of the Pennine chain between Diggle and Marsden, in Yorkshire. The new tunnel is 3 miles and 70 yards long, and has been constructed from the plans and under the direction of Mr. F. Stevenson, Chief Engineer of the company. It is driven through gritstone rock and hard shale and lined with brick. It is a double track. The old pair of narrow tunnels, carrying each a single track under Sandedge, will be closed for a time for inspection and repairs, and then all four tracks will be used.

### Elevated Railroads in Boston and Elsewhere.

Opinion is being freely expressed by leading Boston business men that when it comes to the supreme moment the Boston Elevated Railroad will not be built, as it has been fully demonstrated in other cities that elevated roads do not pay, with one exception, the Manhattan in New York; and when roads in cities with over a million inhabitants can barely earn interest charges, it cannot be expected a road in Boston, tributary to hardly 500,000 inhabitants, can be profitably operated. In Chicago there are three elevated roads, all apparently doing a non-paying business. The Alley "L," the one longest in operation, and which ran to the World's Fair grounds, is not earning fixed charges, and its first mortgage bonds are selling at 68, and second mortgage bonds at 32. The Lake Street "L" first mortgage 5 per cent. bonds are quoted at 61. The Metropolitan "L" is not yet in operation and its first mortgage bonds sell at 63. In Brooklyn, N. Y., there are two elevated roads, which, when street cars were operated by horses, were able to show fair earnings, but since the introduction of the trolley, combined with a poor business year, the roads have barely been able to earn operating expenses and interest on their bonds, let alone dividends. Brooklyn Elevated 1st mortgage 6s are quoted at 94¾ and 2d 5s at 64¾, and Brooklyn Union Elevated 1st guaranteed gold 6s, $6,148,000 outstanding, are quoted at 90½. Kings County Elevated 1st mortgage 5s are selling at 76. The Manhattan Elevated of New York is the only elevated road that has paid, and this is due to the peculiar shape of Manhattan Island, making anything but rapid transit impracticable for people living above Twenty-third street.—*Boston News Bureau.*

### An English Station Clock.

A new clock has lately been put in place in the main departure train house of King's Cross station, London, (Great Northern). It shows the time on two faces, six feet diameter, encased in iron drums fixed on the top of a lattice girder bridge, enabling the time to be seen from either end of the platform. The motion-works in the two drums are connected with the clock by means of connecting rods upwads of 40 feet in length, in iron tubing. The clock movement has been fitted up inside the building. The dials are of opal glass illuminated by electric light inside the drums.

### Cars for Bicyclists.

The Kings County Elevated road, of Brooklyn, N. Y., is now running baggage cars, but they are for only one kind of baggage—bicycles. On Saturdays, Sundays and holidays a car especially fitted up with racks for the purpose will be attached to four trains each way. It is expected that this will be a great attraction to those who ride to and from the suburbs, and who have heretofore been obliged to travel through many badly-paved streets. Checks will be given to insure correct delivery of the wheels to the owners, and the extra charge is only 10 cents. This new service went into effect Sunday, August 19.

### The International Railroad Congress.

A "bulletin" just issued from the office of the American Society of Civil Engineers is misleading in that it states that the only North American railroads members of the International Railroad Congress are the Pennsylvania, the New York Central and the Canadian Pacific. To these should be added the Chesapeake & Ohio, the

New York, New Haven & Hartford, and the Richmond, Fredericksburgh & Potomac, as was announced in our issues of July 13 and July 20.

**South American Notes.**

Through connection by rail has now been established between the Brazilian cities of Pernambuco and Maceio, by the completion of the line from União in the state of Alagoas to Paquevira in the state of Pernambuco.

The enormous destruction of property by the fire in Panama on June 13 last, has strengthened the determination of the citizens of that place to build an aqueduct to provide a more ample supply of water. Steps have already been taken to secure an appropriation for this purpose.

The Santa Fe & Cordoba Great Southern Railroad will soon erect a large grain storehouse in place of the elevator recently burned at Villa Constitucion. It will also make extensive improvements in the harbor of that port, and it is proposed to build a fifty mile extension from Venado Tuerto to Rufino, thus giving it a connection with the Buenos Ayres and Pacific Railroad.

The traffic on the Central (Lima and Oroya) Railroad, Peru, is said to be growing in spite of the decline in silver. Through freight trains are running, carrying large numbers of sheep and cattle to the coast markets. A new industry has been developed in consequence of rail transportation, natural ice being regularly supplied to the trade in Lima and Calloa, from the high Andes.

The Mogyana Railroad, São Paulo and Minas Geraes, Brazil, which has been a profitable and progressive line, reports a diminution of receipts and an increase of expenses. The causes of the decline are stated to be the same as in the case of the Paulista Railroad, but it must be remembered that this road has been boldly pushing in to the thinly settled regions of the northwest of São Paulo and lower Minas Geraes, and that it has suffered somewhat from its pioneering.

The Sapucahy Railroad, Brazil, has secured advances of money from the state of Minas Geraes with which to continue the branch lines that are expected to bring it profitable traffic. The branch to the Mogyana line 220 miles in length, is now building and when completed will give through connection between the Mogyana and the Central Railway, by 350 miles of track. Another extension 90 miles long, will give this road an outlet at Botafoga in the state of Rio de Janeiro.

The Paulista Railroad, São Paulo, Brazil, reports a great decrease in earnings for 1893, said to be due to fall in exchange, block at the port of Santos, shortage of the coffee crop, and the revolution. It would appear also that the decrease has been due in part to the acquisition of a large mileage at an unpropitious time through the purchase of the Rio Claro Railroad. The cost of this line was 26,433,-055 mil reis (the mil reis has fluctuated greatly in value, averaging about 21 cents). The receipts amounted to 10,-231,000 mil reis, against 9,227,000 mil reis in 1892, but the expenses rose from 6,779,000 mil reis to 9,143,000 mil reis. In 1890 the company paid a dividend of 17 per cent. on a capital of 20,000,000 mil reis, at which time the expenses amounted to only 34 per cent., whereas they now exceed 90 per cent. In 1890 there were 155 miles of road in operation, against 480 miles in 1893.

The Guatemala government engineer, Don Mauricio Frary, has submitted a report to his government on the Ferrocarril del Norte, which is to connect the city of Guatemala with Puerto Barrios on the Caribbean Sea. The rails are laid and trains are running twenty miles from Puerto Barrios to Tenedores. This section is at present very lightly constructed, it having been found necessary to push the road across the swampy coast lands to the higher country in order to reach material for ballasting. The steepest grade on this section is 3½ per cent. A pier has been constructed at Puerto Barrios with a depth of 24 ft. alongside. A station, roadhouse, and workshop have also been built here and a station is under construction at Tenedores. Rolling stock has been imported from the United States, and the whole equipment is provided with air brakes and M. C. B. couplers. The contractor, Mr. Silvano Miller, has 1000 men at work on the second section from Tenedores to Arnates, and the cuts have all been made and the fills nearly completed, so that rails will soon be laid.

**Costa Rica Railroad.**

The Bureau of the American Republics learns that the Government of Costa Rica has granted authority to the Costa Rica Railway Co. to make a second issue of bonds to the amount of £100,000 sterling. This money is to be expended in the construction of a long iron pier at Port Limon, and in making extensive repairs along the existing line of railroad, and in meeting existing obligations. The government assumes no financial obligations in this scheme

**Mexican Rail Imports.**

The total amount of British railroad iron and steel imported into Mexico, according to the Mexican Financier, during the first half of the present year, as compared with the corresponding period of 1893, was:

| | First half of 1894. | First half of 1893. |
|---|---|---|
| Tons | 7,846 | 3,613 |
| Value | £35,379 | £17,477 |

**Summer Reading from the New York "Sun."**

To the Editor of the Sun.—Is the attraction of gravitation the same at the surface of the earth (sea level) as it is on the top of a mountain two miles high? If not, what rebate should a railroad allow for a train load, say 500 tons, of freight from New York to Leadville, Leadville being two miles further from the earth's center than New York is? Allowing for thin air and reduced gravitation, how much of a loss would there be in 500 tons weighed in New York and Leadville? ANXIOUS INQUIRER.
Hoboken, N. J.

**Wanted to Strike but Couldn't.**

That good fortune is frequently forced on men in spite of their own efforts, is shown in the case of two Union Pacific firemen who wanted to strike but could not. They were the two youngest men on the regular list, and when the strike was declared, one found himself tied up at Ogden and the other at Milford. No opportunity was offered either to refuse to go out and each cursed his luck that he could not get a chance to strike. Each finally arrived in Salt Lake, and, finding the strike over, reported for duty and was advanced to the top of the list.—*Salt Lake Tribune.*

**A Romance of the Dull Season.**

Previous to the advent of McLeod, the Philadelphia & Reading used an old sign, "Beware of the Engine and Cars," followed by a series of injunctions that no man walking over the road would have patience to read. There were several accidents which brought the company into the Supreme Court, and the sharp lawyers opposed to the company claimed that these signs were not clear warning. McLeod went to Judge Paxson, who wrote this admirable sign: "Railroad Crossing—Stop, Look and Listen." Mr. Paxson received for this modest composition the sum of $4,780, a trifle over $796.66 a word, a higher rate than any author has received in the past. It can fairly lay claim to being the most expensive composition on record, and shows the value of brevity as nothing else could do it.—*Exchange.*

**Electric Railroads.**

The Sandusky Valley Electric Railroad has been incorporated to construct a line from Marion, O., to Port Clinton on Lake Erie, a distance of about 100 miles. The incorporators are J. C. Wirick, R. R. Dumm, Frank E. Dumm, Gottleib H. Roppold and Thomas Carroll.

The Carbondale Traction Co. on August 1, leased for a period of ninety-nine years, its line extending from Archbald to Carbondale, Pa., a distance of eight miles, to the Lackawanna Valley Rapid Transit Co., which will at once build a line to Forrest City, six miles above Carbondale, and later on to Crystal Lake, a rapidly growing summer resort. Additional boilers, engines, dynamos and rolling stock will be purchased at once. H. B. Jadwin is president; J. M. Nicol, treasurer, and D. J. Duncan is superintendent of the Lackawanna Valley Transit Co., with offices at Carbondale, Pa.

The Pennsylvania Traction Co., of Scranton, Pa., has let contracts for building 43 miles of electric railroads to connect with a number of towns around that place.

**Franco-Spanish Railroad Project in the Pyrenees.**

A commission of delegates from France and Spain recently met in Paris and reported favorably upon the project for building two railroads across the Central Pyrenees. One line starting from Saint Girons (Ariège) will ascend the valley of Salat, and will enter Spain by the valley of Noguera-Pallaresa, thence passing through Esterri de Aneo, and ending at Lérida in the valley of the Segre. The second will start from Oloron, ascending the valley of Aspe, and following that of the Gállego on the Spanish side, will unite at Zuera with the line from Zaragoza to Barcelona. The maximum grades will be 13 in 1,000 and the minimum radius of curves will be 300 meters (984 ft.). Two important tunnels, Somport and Salat, will be at an elevation of about 3,900 feet above the sea. The French and Spanish sections of these lines are to be built simultaneously.

**Solved at Last.**

The Reverend Doctor Hoffman, Rector of All Angels Church, and Vice Chancellor of Hobart College, gives the New York *Herald* a plan for rapid transit in New York City which beats Meigs and Boynton and the flying machine men all to pieces. Like all great schemes it is so simple that one wonders that it has never been thought of before. The Reverend Doctor suggests that "instead of on the noisy and nerve wearing rail" New Yorkers should be carried up and down the island on water. Troughs should be provided to carry vessels from the highest points in the city to the lowest by means of water pumped in at the north and emptied at the south, "thus forming a silent and natural motive power." To get up town again other troughs, nearly parallel, should be provided, with an under water cable to which the boats could be attached. For the trip down town no cable would be required, "the power of the falling water being sufficient, particularly if under water adjustable side wings or sails are attached to the boats to catch the main force of the water when required for greater propelling power." Really this is lovely and we should like to see a fleet of boats loaded with commuters coming down-town some morning at the rate of 35 miles an hour, borne on the bosom of this "silent and natural motive power." If the doctor stayed at home that morning he would probably have considerable funeral business to do the next day. If he took the trip someone else could bury him.

**Perpetual Motion.**

Mr. D. J. Whittemore sends us a letter received by him from which the following is an extract: "I am interested in a mechanical device for the propulsion of railway hand cars, a machine that is durable, compact and capable of producing unlimited power or speed at the expense of little exertion from the operator. Once in motion it can be operated with all ease, and, as the driving velocity increases, the lesser is the exertion to run it. It can be put in motion at its highest possible velocity in about 15 to 30 seconds of time.

"It could run velocipedes, inspection and hand-cars as slow as may be desired, or as fast as 30 miles or more per hour by man power with the least possible exertion, because it is a generator of force. The exertion of the operator does not accomplish the work, but simply keeps the machine in motion which multiplies, increases and converts the force given to it into the power of doing the work. It would be a great economizer of time, space and labor.

"I am desirous of ascertaining whether or not such a propelling device as mentioned is wanted or would be valuable for general railway purposes as specified."

Mr. Whittemore asks us to refer the matter to our editor on gas, wind and water. That expert has been seduced away from us by a 100-mile-an-hour electric railroad company and we learn that he has gone to Boston to advise the natives how to get rapid transit. We are incompetent, therefore, to deal with the hand-car man's device.

**Railroad Taxation in North Carolina.**

Those railroads in North Carolina which deem it best to relinquish their right to be exempt from taxation by the State do not find all plain sailing. Judge Simonton, of the United States Circuit Court, has rendered his decision in the North Carolina Railroad case, argued a month ago before him at Greensboro, N. C., and has granted an injunction restraining the directors from putting on the tax list property exempted from taxation in the charter of the company. The State of North Carolina owns three-fourths of the capital stock of this road, which runs from Goldsboro via Raleigh and Greensboro, to Charlotte, and is one of the principal lines in the State. It has been operated under lease by the Richmond & Danville for a number of years. The other fourth of the stock is owned by private stockholders, principally in the North. The directors, on the part of the State, favored placing the property on the tax list, notwithstanding the charter exemptions, as all other roads similarly situated have recently done. The directors, on the part of the private stockholders, opposed such action, the private stockholders having never given their consent to the surrender of the exemption from taxation given to the road in its charter more than fifty years ago, and have kept away from stockholders' meetings until the matter could be passed on by the courts. The suit involves many thousand of dollars, and the decision of Judge Simonton is a victory for the private stockholders. It is reported that the State Railroad Commission may adopt other means of collecting the tax, and further litigaiton is not improbable.

**Graphite for Lubricating Valves of Locomotives.**

The paragraph following is from a letter written by a locomotive engineer "on a prominent railroad." It is sent to us by the Joseph Dixon Crucible Co., of Jersey City, the well known manufacturer of graphite, plumbago, black lead, etc.

"I have run my engine in heavy freight service 115,000 miles with slight running repairs. It is good for 20,000 miles more before the engine will have to be taken in shop for general repair. The valve motion is but slightly worn when compared with other engines of the same class in like work. The engine is noted as a good puller on heavy grades, economical in fuel and oil, and has often been commended by officers, train dispatchers and trainmen as a superior built engine. This is not the true explanation. The secret of success is the daily use of Dixon's graphite, which gives a bright polish to valves, pistons and cylinders. The graphite greatly reduces friction and gives a free action to the valve motion, which also accounts for the slight wear spoken of. This road has several heavy grades and it is a common occurrence for engines to stall on these grades. Whenever I have an unusually heavy train, before approaching such grades I give each valve about two tablespoonfuls of oil and graphite. I have never known it to fail, and it is really wonderful with what ease the engine goes over these hills. The valves work free and easy and the reverse lever can be held with one hand, even with full boiler pressure. This is not generally known by our officials, as what graphite is used is purchased by the engineers. I have often thought of taking up this matter with our master mechanics, but being only an engineer I have come to the conclusion that such a course would be unwise * * *."

## LOCOMOTIVE BUILDING.

The Chicago & Northwestern is considering the ordering of locomotives in the early fall.

The Indiana, Illinois & Iowa is in the market for four six-wheel coupled locomotives.

The Seaboard Air Line is considering the letting of contracts for ten locomotives.

The Calumet & Blue Island is considering the ordering of two or three consolidation locomotives.

## CAR BUILDING.

The New York, Lake Erie & Western is building 100 box cars at its Buffalo shops.

The Pennsylvania lines west of Pittsburgh have been asking bids on from 300 to 500 box cars, but it has not been decided yet when the contracts will be let.

The New York, Susquehanna & Western has given an order to Murray, Dougal & Co., of Milton, Pa., for 200 coal cars. This order is in addition to the one for 400 coal cars given in July. Delivery of the cars will commence early in September.

## BRIDGE BUILDING.

**Brown's Station, Pa.**—The new bridge across the Monongahela River, at Brown's Station, on the Baltimore & Ohio, is now being erected. Two of the five piers have been completed, the work being done by Drake, Stratton & Co., of 143 Liberty street, New York city. The iron work will be done by the Phœnix Bridge Co., of Philadelphia, about 300 tons of iron being necessary.

**Cleveland, O.**—At a recent meeting of the Board of Control, the contract for repairing the Jefferson Street Bridge was approved. The substructure will be built by Nichol & Jones for $600, and the superstructure will be built by the King Bridge Co. for $3000.

**Easton, Pa.**—At a meeting of the Commissioners of Lehigh and Northampton Counties, it was decided to build a new bridge at Broad street. The contract was awarded to the Variety Iron Works, of Cleveland, O., at its bid of $11,821. The first bid was $9,021, but the County Commissioners decided to destroy the old piers and erect larger ones. The bridge will be built to admit of widening when necessary.

**Elizabeth, N. J.**—The House of Representatives has passed a bill authorizing the construction of a bridge across Newark Bay, New Jersey, between the cities of Elizabeth and Bayonne, at a point not less than 500 feet above the Central Railroad bridge.

**Franklin, Pa.**—The contract for the Cherrytree Run bridge, in Cornplanter township, has been awarded by the county commissioners to the Toledo Bridge Company, of Toledo, O., at $10.25 per foot. J. N. Moore, of Clinton township, received the contract for stonework at $3.87 per perch.

**Hamilton, O.**—Bids will be received by Frank X. Duerr, County Auditor, until August 31, for building the superstructure of a viaduct over the Miami River, between High and Main streets.

**Helena, Mont.**—Bids will be received until September 10, by J. S. Tooker, County Clerk, for the superstructure, substructure and necessary grading for two 65-feet iron or steel bridges over Ten-Mile Creek.

**New Whatcom, Wash.**—The County Commissioners have decided to call for bids for building two or more bridges over Nooksack River, at Welcome and at Acme. The bridge at Welcome will be about 175 feet long, and the one at Acme will be about 160 feet long. Contractors are to furnish their own plans and specifications.

**Philadelpia, Pa.**—Filbert & Porter, the contractors for the new Falls bridge over the Schuylkill River have started the preliminary work. The structure will be of steel, and will replace the one blown down in 1893.

**Pierre, S. D.**—The pontoon bridge between Pierre and Fort Pierre was washed away during a storm on August 16. The bridge would have been completed and put in operation in a few days. It was badly demolished, but will be rebuilt.

**Red Wing, Minn.**—The contract for building the superstructure of the wagon bridge over the Mississippi river was awarded to the Toledo Bridge Company at its bid of $29,561.

**Ronceverte, W. Va.**—The County Commissioners of Greenbrier County have passed an ordinance appropriatting the money necessary to build a bridge over Mill Creek, in the Blue Sulphur district.

**Vicksburg, Miss.**—Bids will be received until September 3, by J. D. Laughlin, County Clerk, for building

an iron bridge over Bear Creek, in Warren County. Plans and specifications are on file in the office of the County Clerk. The bridge will be a low truss single span of 65 feet, with 75 feet of approaches, being three spans of 20 feet each, and one span of fifteen feet. The bridge will be of iron, on concrete foundations. The width of the roadway will be 12 feet clear.

**Washington, D. C.**—The Superintendent of Bridges has submitted a report advising the construction of a new bridge over Rock Creek, on Massachusetts avenue, at a cost of $175,000, and recommending the following improvements: That the K Street Bridge over Rock Creek be reconstructed at a cost of $30,000, and the Navy Yard bridge over the Eastern branch boe cnstructed at cost of $250,000; also that the P Street Bridge over Rock Creek be widened and otherwise improved at a cost of $30,000.

**Westville, Ind.**—The Indiana Bridge Co., of Muncie, Ind., has been awarded the contract for replacing the Lemon bridge, near Westville, Ind., with an iron structure. The cost will be $9,000.

## MEETINGS AND ANNOUNCEMENTS.

**Dividends.**

Dividends on the capital stocks of railroad companies have been declared as follows:

*Chicago, Burlington & Quincy*, quarterly, 1¼ per cent.

**Stockholders' Meetings.**

Meetings of the stockholders of railroad companies will be held as follows:

*Chicago, Milwaukee & St. Paul*, annual, Milwaukee, Wis., Sept. 22.
*New York, Susquehanna & Western*, annual, Jersey City, N. J., Sept. 6.
*Iowa Central*, annual, Chicago, Ill., Sept. 7.
*Toledo & Ohio Central*, annual, Toledo, O., Sept. 3.
*Wabash*, annual, St. Louis, Mo., Sept. 11.

**Technical Meetings.**

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its annual convention in New York city beginning Sept. 11, and lasting three days. The first meeting will be held in Tammany Hall, and the following ones at the Broadway Central Hotel, which will be the headquarters of the Association.

*The Master Car & Locomotive Painter's Association* will hold its annual convention at Buffalo, N. Y., on Sept. 12, 13, 14. The headquarters will be at the Genessee Hotel.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York city, on the third Thursday in each month, at 8 p. m.

**Society of Naval Architect and Marine Engineers.**

The next annual meeting of this society will take place in New York City Nov. 15 and 16. Particulars as to papers to be read and programme will be issued later.

**Roadmasters' Association of America.**

The entire basement of the Broadway Central Hotel, New York City, will be given up for the use of exhibitors at the annual convention of the Roadmasters' Association of America, which will hold its annual meeting at that place on September 11 next. Applications for space should be addressed to W. W. Salmon, President of the Road and Track Supply Association, 927 The Rookery, Chicago, Ill. Those wishing to exhibit should apply for space at once, as the time is rather limited.

**Master Car and Locomotive Painters' Association.**

The twenty-fifth annual convention of the Master Car and Locomotive Painters' Association will be held at Buffalo, N. Y., on the 12th, 13th and 14th days of September, 1894, convening at 10 o'clock a. m. on Wednesday, the 12th. The headquarters of the association will be at the Genesee Hotel, where the rate for rooms will be $3 a day, which may be engaged in advance of the meeting. This being the twenty-fifth annual meeting, it is expected there will be a large attendance, not only of members but of master car and locomotive painters generally, who are cordially invited to attend the convention and enroll themselves on the list of active members. The following list of subjects has been prepared for discussion: (1) "What is the best method of keeping accounts in the paint shop? Labor and material." D. A. Little, Pennsylvania R. R. (Juniata shop), Altoona, Pa.; C. E. Mance, N. Y., O. & W. R. R., Middletown, N. Y.; Eugene Laing, Nor. Cent. R. R., Elmira, N. Y. (2) "What methods and materials produce best results in repainting passenger cars that are badly cracked, and is there any method by which cracks in old paint can be obliterated without burning off?" J. H. Pitard, Mobile & Ohio R. R., Whistler, Ala.; R. W. Scott, C. G. W. R. R., South Park, Minn.; J. W. Houser, Cumberland Valley R. R., Chambersburg, Pa. (3) "In adopting a classification of repairs to passenger cars, what are the various conditions of the paint or surface that should determine the class of repairs, or what standard can be adopted by which to determine when the condition of the paint requires certain class repairs?" G. R. Cassie, L. S. & M. S. R. R., Adrian, Mich; W. O. Quest, P. & L. E. R. R., McKee's Rocks, Pa.; J. A. Gohen, C., C., C. & St. L. R. R., Indianapolis, Ind. (4) An essay on painting passenger cars, in the form of questions and answers." F. S. Ball, Pennsylvania R. R., Altoona, Pa. (5) "What is the best method of computation and establishing rates for piece work on the different classes of painting repairs for passenger equipment cars?" T. H. Dunlap, B. & O. R. R., Pittsburg; F. P. McCullen, Pennsylvania R. R., Philadelphia: D. B. Vail, N. Y., L. E. & W. R. R., Buffalo, N. Y. (6) "What is the best method of computation and establishing rates for piece work on the different classes of painting repairs for locomotives?" C. Mason, Pennsylvania R. R., Altoona. (7) "What is the best method to adopt to insure the proper care of and prevent loss of paint shop tools, namely: Brushes, chamois skins, sponges, dusters, buckets, cups, etc.?" H. G. Taylor, P. & W. Ry., Allegheny, Pa.; H. M. Butts, Northern Pacific R. R. (Como Shops), St. Paul; J. A. Putz, Wisconsin Central R. R., Stevens Point, Wis. (8) "What advantages, if any, is there in using ready prepared primers and surfaces on cars and locomotives in preference to those prepared from our own formulas, convenience, time and durability considered?" R. J. Kelly, Long Island R. R., Brooklyn, N. Y.; J. E. Blocksidge, D. & H. Canal Co., Carbondale, Pa. (9) "What primers and surfacers, or formulas for the same, which do not contain white lead, have proven satisfactory substitutes for lead primers and surfacers on the outside of passenger cars and locomotives?" F. W. Wright, M. C. R. R., St. Thomas, Ont.; C. E. Copp, Boston & Maine R. R., Lawrence, Mass.; H. Rivers, C., M. & St. P. R R., Milwaukee. (10) "What style of finish in the construction of passenger equipment cars is the most desirable from a painter's standpoint, namely: The easiest painted or cleaned and kept in repair, durability and economy considered? The panel siding with battens, or a 2 or 2½ inch beaded or tongue and groove siding?" S. Brown, late of Old Colony R. R., Boston, Mass.; J. G. Keil, Chicago & Alton R. R., Bloomington, Ill.; T. H. Cornish, S. P. R. R., San Francisco, Cal. (11) "Report of the committee on tests." A. Hunnicke, M., K. & T. R. R., Sedalia, Mo.; Thomas Byrne, C. & O. R. R., Richmond, Va.; J. J. Miller, L. & N. R. R., Bowling Green, Ky.; W. J. Josnehans, P., Ft. W. & C. R. R., Allegheny, Pa.

## PERSONAL.

—Mr. George J. Lockie has resigned as General Manager of the National City & Otay.

—Mr. Russell Harding, Superintendent of the Missouri Pacific, with headquarters at Wichita, Kan., has resigned.

—Colonel Elisha P. Jennett, who was one of the promoters of the Central Vermont Railroad, died at Montpelier, Vt., on August 19, aged 93.

—Mr. C.W. Paris has resigned as Central Passenger Agent of the Cleveland, Cincinnati, Chicago & St. Louis, the resignation to take effect September 1.

—General Traffic Manager John Taylor, of the Lehigh Valley, arrived in New York on the Campania on August 17, after spending a three months' vacation in Europe.

—Mr. De Witt Loomis, formerly manager of the Detroit Steel & Spring Co., has been elected Vice-President and General Manager to succeed Mr. Charles P. Choate, deceased.

—Mr. James P. Ray, head of numerous woolen and cotton mills in New England, and President of the Milford, Franklin & Providence, the Rhode Island & Massachusetts, and the Woonsocket & Pascoag Railroads, died in Franklin, Mass., on August 17, at the age of 74.

—Mr. Burton C. Cook died at his home in Evanston, Ill., on August 18. Mr. Cook was for several years previous to 1864 attorney for the Chicago, Rock Island & Pacific, and in 1870 he became General Solicitor of the Chicago & Northwestern. He was the man who nominated Abraham Lincoln for the presidency in 1860 and 1864.

—A brief press despatch states that Lieutenant Freeman H. Crosby, United States Navy, attached to the United States Coast Survey steamer McArthur, has been drowned off the coast of Oregon, together with a boat crew consisting of five men. They were engaged in off-shore hydrography, in connection with the United States Coast Survey. Lieutenant Crosby was a graduate of the Naval Academy, having been appointed in 1866.

—Mr. Jeremiah Prescott, formerly Superintendent of the Eastern Railroad, now the Fastern Division of the Boston & Maine, died at his home in Arlington, Mass., on August 17. Mr. Prescott began as conductor on the Eastern road in 1844, and served in that capacity and as master of transportation for 10 years. He became superintendent in 1854 and held the office 20 years. In 1875 he was appointed General Manager of the Hoosac Tunnel and railroad, and held the office for four years while the property was operated directly by the State of Massachusetts.

—Hon. Aldace F. Walker, ex-Interstate Commerce Commissioner, and more recently Railroad Traffic Commissioner, has been appointed as one of the receivers of the Atchison, Topeka & Santa Fe, to succeed J. W. Reinhart. The appointment was made by Judge Caldwell of the United States Circuit Court at St. Paul, on the application of the bondholders, all parties having concurred in the application. Colonel Walker is now in Europe, and it appears that the appointment came to him as a surprise, but it is stated that he has accepted and will come home at once. The press is unanimous in its approval of the appointment. Colonel Walker is about 52 years old, and was a lawyer in New York City and in Vermont, his native state, before his appointment to the Interstate Commerce Commission. He left the latter body in 1889 to become chairman of the Interstate Commerce Railway Association, the first "gentlemen's agreement" of the road west of Chicago. He was subsequently made chairman of the Western Traffic Association, the successor to the last mentioned. With the latter association he had a contract for three years at $25,000 a year, though the association lasted only about eighteen months. In December, 1892, a few months after the collapse of the Western Traffic Association, he was made chairman of the joint committee of the Trunk Line and Central Traffic associations. His engagement was for one year only, and since its expiration he has resumed the practice of law in Chicago.

—Mr. France Chandler, general passenger and ticket agent of the Wabash, died at St. Louis, Mo., on August 21, of paralysis, at the age of 65. Mr. Chandler first entered railroad service in 1854, on the Buffalo, Corning & New York, now a part of the New York, Lake Erie & Western. In 1856 he entered the employ of the Chicago, Rock Island & Pacific. In 1863 he was appointed general ticket agent of the Columbus & Indianapolis at Indianapolis. In 1865 he became general ticket agent of the Chicago & Great Eastern at Chicago, and in 1866 he again became general ticket agent of the Columbus & Indianapolis. In 1869 he was appointed general ticket agent of the Vandalia at St. Louis. In 1871 he became general passenger and ticket agent of the North Missouri. In 1873 he became assistant general passenger agent of the Illinois Central, and in 1877 he became general passenger and ticket agent of the Chicago, St. Louis & New Orleans. For three years, from 1880 until 1883, he was general passenger and ticket agent of the Missouri Pacific at St. Louis, and from May, 1883, until June, 1884, he was general ticket agent of the same road and of the Wabash, St. Louis & Pacific. From June, 1884, until 1886, he was general passenger and ticket agent of the Wabash, St. Louis & Pacific, and from 1886, until July, 1889, he was general passenger and ticket agent of the Wabash Western, and in July, 1889, he was appointed general passenger and ticket agent of the Wabash, which position he held at the time of his death.

## ELECTIONS AND APPOINTMENTS.

*Amsterdam, Johnstown & Gloversville.*—The following are the officers of this company, which proposes to build a railroad from Amsterdam, N. Y., to Gloversville: President, David A. Wells, of Johnstown; Vice-President, Francis Morris, of Amsterdam; General Manager, Lawton Caten, and Treasurer, James W. Greene, both of Gloversville, N. Y.

*Cleveland, Cincinnati, Chicago & St. Louis.*—L. P. Lockwood has been appointed General Agent at East St. Louis, to succeed George W. Benson, resigned to become Assistant General Freight Agent of the Chesapeake & Ohio, at Cincinnati.

W. E. Moore, General Agent at Middletown, O., has been transferred to Sandusky, O., to succeed L. P. Lockwood.

The headquarters of the Michigan Division have been removed from Anderson, Ind., to Benton Harbor, Mich.

*Great Northern.*—Circulars have been issued announcing that the system will be operated in three general divisions to be known as the Eastern, Western and Montana, and that the office of General Superintendent and of all the other division superintendents will be abolished. In their places there will be three general superintendents. E. W. McKenna will be General Superintendent of the eastern district with headquarters at St. Paul, including all lines east of Havre, Mont. J. D. Farrell will be general superintendent of the western district with headquarters at Spokane, including the coast lines and all branches west of Havre. The third district is the Montana Central and its leased lines, of which D. McLaren was recently appointed general superintendent. His headquarters are at Great Falls. C. P. Adams has been appointed superintendent of telegraph, to succeed J. B. King. The appointment takes effect August 20.

*Lehigh Valley*—E. B. Byington, General Western Passenger Agent, has had his territory extended to include all as far east as Geneva, N. Y. The office of District Passenger Agent at Rochester, has been abolished.

*Missouri Pacific*—A. H. Webb, Division Superintendent at Conway Springs, Kan., has been appointed Division Superintendent at Wichita, Kan., to succeed Russell Harding.

*Mobile & Birmingham.*—L. A. Bell has been appointed General Passenger Agent, with headquarters at Selma, Ala., to succeed B W. Wrenn, resigned to accept service with another company.

*National City and Otay.*—E. A. Hornbeck has been appointed Superintendent in charge of the operating department in addition to his duties as Assistant Treasurer. His headquarters are at National City, Cal.

*Pennsylvania.*—Colin Studd has been appointed passenger agent of the Southeastern District, to succeed R. A. Parke, resigned.

*Utah Central.*—J. H. Burgoon has been appointed General Superintendent and General Freight and Passenger Agent, with headquarters at Salt Lake City, to succeed T. J. Mackintosh, resigned.

## RAILROAD CONSTRUCTION.

### Incorporations, Surveys, Etc.

**Ahnapee & Western.**—The extension of this road from Ahnapee, Wis., northwest to Sturgeon Bay, 18 miles, has been completed. The road now extends from Casco east 13 miles to Ahnapee, and then 18 miles north to Sturgeon Bay. The completion of the road will open up for traffic the long peninsula that lies between Lake Michigan and Green Bay. E. Decker, of Ahnapee, is President of the company.

The charter was granted in 1890, and the preliminary surveys were begun in the fall of that year. Grading was begun in October, 1891, and in August, 1892, the road had been completed to Ahnapee, thirteen miles. The next year the line was extended to Sturgeon Bay, and on July 2, 1894, the first train was run over the entire line. The road was built and is owned by Edward Decker and his son, David Decker. Financial aid was granted by the city of Sturgeon Bay and Door county, $76,000 being subscribed. Other towns along the line gave $32,000. Edward Decker, of Ahnapee, Wis., is president of the company.

**Amsterdam, Johnstown & Gloversville.**—Active work in constructing this road will be commenced at once, and it is the intention of the company to have trains running by January. The road will extend from Akin, near Amsterdam, N. Y., north to Gloversville, 10 miles. The officers of the company are: President, David A. Wells, of Johnstown; Vice-President, Francis Morris, of Amsterdam; General Manager, Lawton Caten, and Treasure, James W. Greene, both of Gloversville, N. Y.

**Binghampton & Williamsport.**—Work commenced on the northern portion of the line a few days ago. The road extends from Binghamton, N. Y., south, into Susquehanna county, thence southeast down the Wyalusing Valley to Wyalusing, about 45 miles, where a junction will be made with the Lehigh Valley.

**Buffalo, Attica & Arcade.**—The name of the Attica & Freedom, extending from Attica to Freedom, 33 miles, a reorganization of the Tonawanda Valley & Cuba, has been changed as above, and work has been commenced on widening the gage. It was found necessary to widen the road-bed as far as Earl's Station, a distance of five miles from Attica. The work is nearly completed and the remaining distance to Arcade is all ready for laying the standard gage. The work of laying ties has begun at Johnsonburg, and the same work will begin at Attica in a few days. New rails and ties are being used, and new bridges will be erected. As soon as the road is finished it will be well equipped for the handling of all kinds of traffic. S. S. Bullis, of Olean, has purchased the road. W. G. Conklin, General Superintendent and Manager, has charge of the work. It has not as yet been decided which line this road will connect with for through business at its Southern terminus, but it is expected it will be the Western New York & Pennsylvania.

**Cape Cod South Side.**—Surveys are now being made for this railroad by W. H. Healey, of Plymouth, Mass. The road will leave the Woods Holl branch of the Old Colony at North Falmouth, Mass., about six miles from Buzzard's Bay Station, and extend southeast to East Falmouth, then east along the south shore of Cape Cod, paralleling the Old Colony through Waquoit, Cotuit, and Centerville to Hyannis, a distance of twenty miles. No contracts have been let. The directors are: F. W. Parsons, of Osterville, Mass.; Charles H. Nye, of

Hyannis; W. V. Killen, Winslow Warren, and Joseph C. Stevens, of Boston, and George W. Owens, of Savannah, Ga.

**Chicago, Burlington & Quincy.**—It is expected that the extension being built from Sheridan, Wyo., to Billings, Mont., will be completed and ready for operation about Nov. 1. This will connect the Burlington with the Northern Pacific and it is said that the distance from Kansas City to Portland will be much shorter than by any other line.

**Clearfield, Conemaugh & Western.**—The final survey for about 30 miles from connection with the Beech Creek, above Belsena, Clearfield county, Pa., to Irona has been made and a report will be made at a directors' meeting to be held soon. It is expected that a contract for building the road will be let about September 10. The route surveyed follows the Little Clearfield Creek for some distance and affords easy grades. There are large timber tracts and valuable deposits of bituminous coal along the line of the road. There is talk of further extending the line on to Pittsburg. S. J. M. McCarrell, of Harrisburg, Pa., is president and Samuel Brugger, of Flemington, chief engineer.

**Elkton, Massey's & Middletown.**—The Pennsylvania Railroad has decided on the route of this road into Elkton, Md. It will enter Elkton over the tracks of the Philadelphia, Wilmington & Baltimore. The new road will join the main line about 500 yards west of the Elkton station. By this route the line will cross the Elk River over a bridge which is to be built. The route between Elkton and Chesapeake City, eight miles, in the eastern peninsular of Maryland, has been decided upon, and work will commence within a few weeks.

**Gulf, Beaumont & Kansas City.**—Reports state that a contract has been let to Snyder Bros. and H. Hanson for building a branch of this road from Buna, a new lumber town in Jasper County, Tex., The branch will extend from Buna north along the county line between Jasper and Newton counties to some timber lands, 15 miles distant. It is expected that the branch will be completed in 90 days.

**Kingfield & Dead River.**—This road has been completed and is now open for passenger traffic. It is a narrow gage road 11 miles long, extending from Kingfield, Me., to Carrabassett, in Jerusalem plantation.

**Lexington & South Canadian Valley.**—This company has been incorporated in Oklahoma to build a railroad from a point in the southeastern part of Pottawatomie County, on the north bank of the South Canadian River, along the valley of the South Canadian, northwest to Lexington, in Cleveland County, then north to a point at or near Walker's Switch, on the Atchison, Topeka & Santa Fe, in Cleveland County; then northwest to a point at or near Union City, on the Chicago, Rock Island & Pacific, in Canadian County, then to the western boundary line of Oklahoma Territory, in "E" County. The railroad will follow the banks of the South Canadian River, and will be about 200 miles long. The incorporators are: E. J. Keller, J. S. Little, S. C. Hawk, B. Weirzenhoffer, F. W. Hawes, J. R. Vivian, E. M. Abernathy, W. S. Upp, J. M. Stovall, W. H. Johnson, H. L. Forehand, J. C. Dowdy, and W. H. Blackwell, all of Lexington, Oklahoma.

**New Roads.**—A meeting of citizens of Moss Point, Miss., was held on August 11, to take steps to build a railroad from that place to Scranton and East Pascagoula. Captain G. H Howze, of Moss Point, proposed to build the road if the right of way and a bonus of $10,000 are donated, the latter to be paid when the road is running. A committee was appointed to secure subscriptions and right of way.

**San Pete Valley.**—Work on the extension south of Manti, Utah, is reported as progressing at a good rate. Four and a half miles of the grade are now finished and ready for the ties. The heaviest work will be encountered on the fifth and seventh miles, where some big cuts and fills are necessary. The eight miles of the extension will be completed and in operation by October 1.

**Toledo & Ohio Central.**—Work has commenced on the belt line at Columbus, O. The new road will connect Columbus with the old main line from Toledo to the Ohio River, Columbus not being on the main line. The extension will require about ten miles of track. The improvements will require the building of a double-track iron bridge over the Scioto River. A new freight house and terminals are being built in Columbus. This will give the company its own terminals in the city. The improvements are expected to be completed by December 1.

## GENERAL RAILROAD NEWS.

**Carolina Central.**—First mortgage bondholders met in New York on August 17 in pursuance of the adjournment of the meeting that was reported in the *Railroad Gazette* of August 10. The committee appointed to devise a plan for the protection of the property, made a report, recommending that the Seaboard Air Line, which operates the road, be asked to guarantee payment of the 4 per cent. interest on the first mortgage 6s and to issue trust certificates for payment of the remaining 2 per cent. The plan was approved by the meeting. It is said that the directors of the Seaboard Air Line have agreed to this plan and that they also agree to spend in improvements on the Carolina Central an amount not to exceed $250,000. The bonds are held in New York, Philadelphia and Baltimore.

**Cumberland Valley.**—The viewers appointed by the Cumberland County Court to assess the damage sustained through the taking of the abandoned South Penn bridge piers in the Susquehanna River at Harrisburg, and land between Riverton and White Hill, made a report August 20, fixing the damages at $2,650. The company intends ultimately to build a freight line from the main line at White Hill, into Harrisburg, and do away with the running of freight trains through the Union Station at Harrisburg. Recently a similar jury awarded the South Penn $2,800 damages for its abandoned and partly constructed line, between Tuscarora Tunnel and Mt. Dallas.

**Houston Belt & Magnolia Park.**—Application for the sale of this road has been made in the Civil District Court at Houston Tex. The application is made by T. D. Cobbs. It is alleged that the net income for the operation of the road is not more than enough to pay the current expenses. The road extends from Houston, Tex., to Port Houston, on Buffalo River, six miles.

**Georgia Pacific.**—This road was sold under foreclosure at Atlanta, Ga., on August 18, and was bid in by C. H. Coster, for the Southern Railway Company. The sum paid was $500,000, the minimum amount at which the property could be sold under the order of the court. Judge Newman, of the United States Court for the Northern District of Georgia, has confirmed the sale, and Judge Niles, of the Mississippi, and Bruce, of Alabama, will doubtless do likewise. The Southern Railway will begin to operate the road on September 1. The Georgia Pacific main line is from Atlanta, Ga., via Birmingham, Ala., to Greenville, Miss., on the Mississippi River, 455 miles, and a number of branch lines in Alabama and Mississippi, aggregating about 100 miles.

**Jacksonville Southeastern.**—John G. Shortall, of Chicago, has brought suit in the Sangamon County Circuit Court at Springfield, Ill., on behalf of the holders of first mortgage bonds for $300,000 to foreclose the mortgage. The suit will also be asked to operate against the Jacksonville, Louisville & St. Louis, the road now in the hands of Judge S. P. Wheeler as Receiver under appointment by the Circuit Court.

**Louisville Southern.**—The property and franchise of the Louisville Southern Railroad were sold under foreclosure at Louisville, Ky., on August 16, the buyer being Mr. C. H. Coster, Chairman of the Richmond Terminal Reorganization Committee. The price was $1,000,000, the minimum sum prescribed by the court, the sale being subject to the lien of the mortgages of June 22, 1887, and January 1, 1889, to the Louisville Safety Vault and Trust Company. The sale was confirmed by Judge Lurton on August 17, and the road at once becomes a part of the new Southern Railway.

**Minneapolis & St. Louis.**—The date for the sale of this property under foreclosure has been fixed, and it will take place October 11, in Minneapolis. It is said that it will take about $5,000,000 to redeem the property, and it is practically assured that the Chicago, Rock Island & Pacific will bid it in. That road already owns a large amount of Minneapolis & St. Louis bonds.

**Pennsylvania Midland (South Mountain).**—At last week's meeting of the directors in Philadelphia the plans and surveys were approved and ordered to be filed at Harrisburg. The Blue Mountain has for some weeks been engaged in a careful resurvey of the old South Mountain route. G. G. Williams, of Philadelphia, is president, and J. H. Murphy, of Reading, chief engineer of the Pennsylvania Midland.

**Terminal Railroad Association of St. Louis.**—The new Union station at St. Louis, which has been under construction about two years, is practically completed and will be put in use on Sept. 1. A diagram of the tracks is published on another page of this paper. The Missouri, Kansas & Texas and the Burlington lines west of the Mississippi River are to run their trains to and from the new station as soon as a connecting track from their present terminals in the northern part of the city can be built, and this track will be begun as soon as the old Union station is vacated. This connecting track will be on an elevated structure in the street for a part of the way, and contracts for the iron work have already been let. This new connection will make a direct route from the Merchants' Terminal Bridge to the new station, and it is said that some of the roads approaching St. Louis from the East and North will probably run their trains over the Merchants' instead of the old bridge.

**Valley (Ohio).**—The reorganization committee of this road, now in the hands of receivers, last week submitted a report. They recommend that the bonds, of all classes, be deposited with the Manhattan Trust Company, New York, and the property sold. When this has been done, it is proposed that the reorganized company issue $6,000,000 in 4 per cent. first mortgage bonds, $4,000,000 in 3 per cent. income bonds, and as much capital stock as may be required by the laws of Ohio. Of the first mortgage bonds one-third are to remain in the treasury to be used for improvements, and the remainder are to be divided among the holders of the existing bonds, on a basis corresponding with their face value. Whatever remains after this distribution is to be divided pro rata among the holders of the 6 per cent. second mortgage bonds, after the committee have settled all legal claims prior to the second mortgage bonds. New terminals are provided for, if those now being used cannot be secured with clear title. By the terms of the proposed plan the guarantee of the $6,000,000 in bonds is to be furnished, not by the Baltimore & Ohio, but by the Wheeling & Lake Erie. The Valley would afford an excellent entrance to Cleveland for that road. The plan provides that the capital stock of the new company, paid in full, be turned over to the Wheeling & Lake Erie in consideration of the guarantee.

**Western North Carolina.**—The road was sold under foreclosure at Statesville, N. C., Aug. 21, and the Northwestern North Carolina was sold in the same way at Winston, N. C., in the afternoon of the same day Both roads were bid in by C. H. Coster and will be turned over at once to the Southern Railway Co. The Northwestern North Carolina runs from Greensboro to Wilkesboro, 100 miles. The Western North Carolina runs from Salisbury to Paint Rock, a distance of 185 miles, and from Asheville to Murphy, 122 miles, a total of 309 miles.

## TRAFFIC.

### Traffic Notes.

The Burlington and the Union Paific have agreed to reduce rates on grain from Omaha to interior points in Nebraska to give the farmers a chance to get feed for their stock, on account of the drouth.

The Soo Line has given notice of an advance of $5 in second class rates from St. Paul to San Francisco via both Portland and Victoria. This action is looked upon as important in view of the recent protest of the Western liness to the Trunk Lines against the inclusion in their rate sheets of the differential rates quoted by the Soo.

The St. Joseph & Grand Island road has closed about a dozen stations on account of the failure of the corn crop. The failure of the crop not only deprives the road of freight but the inhabitants of these towns have largely moved away, so that there is no business of any kind.

The Ferris wheel is to be brought from Chicago to New York by the Lake Shore and the New York Central. The car built by the Pennsylvania to carry the Krupp gun to the World's Fair will be used for carrying the shaft.

The Galveston Freight Bureau is expected to be ready for business by Sept. 1. The commissioner is Mr. Groseclose.

The Canadian Pacific has lately secured a party of 250 Scandinavian immigrants for the western part of the United States. They landed at Halifax, though they came on a steamer which had no other passengers except for New York.

The Railroad Commissioners of Texas have issued their first tariff since their "resumption of business." It is Commodity Tariff No. 1, and gives the rates on cotton in bales. It goes into effect Sept. 1 and is said to make only slight reductions from existing rates. The rate for 30 miles or less is 15 cents and for 100 miles 45 cents, but there is a long list of exceptions. The rules attached to the tariff give very particular directions about adjusting the allowances for compression of cotton according to the distance it is carried.

### Chicago Traffic Matters.

CHICAGO, August 22, 1894.

Westbound traffic is picking up, and the roads look for a large increase in general merchandise as soon as goods now in bond are released. Western roads will be favored equally with eastern lines in this movement, as all merchandise stocks are known to be very low.

The restoration of the lake and rail eastbound rates, together with a marked increase in grain offerings and a slight improvement in the lumber carrying trade, encourages the lake lines to believe that a fair amount of tonnage will be secured during the balance of the season. Soft coal shipments are heavy and are likely to continue so. Grain rates have advanced to 1¼ cents to Buffalo and hold steady.

Western passenger lines have voted to run harvest excursions on September 11 and 25, and October 9 at one-fare, plus $2 for the round trip, with a minimum round-trip selling rate of $7. Tickets will be limited to twenty days.

Efforts are still being made by the Southern Pacific to bring about the reorganization of the Trans-Continental association, and a conference has been asked for this purpose. It is not probable that the Atchison and Union Pacific will favor the move yet.

The Southwestern Traffic association meeting, which has been held here for the past two weeks, adjourned without having finally settled the adjustment of rates from Texas to Atlantic Coast points.

Central traffic lines being unable to agree on percentages to govern eastbound freight via Peoria under the agreement, have submitted the matter to Chairman J. W. Midgley, as arbitrator. His decision will be final and will be retroactive to August 1. This action follows naturally the fixing of percentages via Chicago, and similar action is contemplated at other gateways, should the Peoria agreement work all right.

Considerable speculation is being indulged in concerning the outcome of the action taken by Central Traffic passenger officials last week, refusing to accept tickets or orders for business to the conclave of the Knights of Pythias at Washington unless same were on the established dates (August 22-26), and not to accept them from any connection quoting less than one fare for the round trip. The point of the matter is that the Missouri, Kansas & Texas has been advertising a rate of $25 for the round trip from all points in Texas, and if the eastern lines keep their agreement the Missouri, Kansas & Texas will find itself unable "to deliver the goods." That line, however, professes its ability to do so, notwithstanding the agreement.

The action of the lake line managers in restoring eastbound lake and rail rates to the basis in effect April 2, effective August 17, and deciding that tariffs from Minneapolis issued by initial rail lines be maintained on the basis of 22½ cents per 100 pounds, Minneapolis to New York, is received with great satisfaction by the Chicago lines who now look for the maintenance of all-rail rates for the balance of the season. It evidences the conservative spirit at present prevailing among all the lines that no serious break in all-rail rates has followed the numerous cuts made in lake and rail rates during the past few weeks.

On account of a large number of tickets of Illinois Central issue reading from New Orleans to Omaha via Chicago having recently been found on the market here, that company has announced that with the next issue of its rate sheet it will cease quoting rates between these points via Chicago, confining them to the St. Louis gateway.

It is rumored that upon the completion of the Indiana, Illinois & Iowa to South Bend, Ind., the westbound fast mail via the Lake Shore for western points will be turned over that road instead of coming via Chicago. The report cannot be confirmed, but it is believed that the matter is under consideration.

The appointment of ex-Chairman Walker as one of the receivers of the Atchison is well received here, and it is universally conceded that his qualifications admirably fit him for the position. It is predicted that he will give satisfaction to all interests.

The shipment of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending August 18, amounted to 45,589 tons, against 49,255 tons during the preceding week, a decrease of 3,666 tons, and against 44,852 tons for the corresponding week last year. The proportions carried by each road were:

| ROADS. | WEEK TO AUG. 18. | | WEEK TO AUG. 11. | |
|---|---|---|---|---|
| | Tons. | p. c. | Tons. | p. c. |
| Michigan Central | 4,330 | 9.4 | 6,015 | 12.2 |
| Wabash | 3,772 | 8.3 | 3,548 | 7.2 |
| Lake Shore & Mich. South. | 6,096 | 13.4 | 6,107 | 12.4 |
| Pitts., Ft. Worth & Chicago. | 5,602 | 12.3 | 6,717 | 13.6 |
| Pitts., Cin., Chi. & St. Louis | 6,744 | 14.8 | 4,795 | 9.7 |
| Baltimore & Ohio | 2,642 | 5.8 | 3,240 | 6.6 |
| Chicago & Grand Trunk | 4,218 | 9.3 | 4,467 | 9.1 |
| New York, Chic. & St. Louis | 6,028 | 13.2 | 5,812 | 11.8 |
| Chicago & Erie | 4,636 | 10.2 | 7,065 | 14.2 |
| C. C. C. & St. Louis | 1,521 | 3.3 | 1,489 | 3.0 |
| Totals | 45,589 | 100.0 | 49,253 | 100.0 |

Of the above shipments 1,789 tons were flour, 11,937 tons grain and mill stuff, 10,882 tons cured meats, 10,475 tons dressed beef, 1,140 tons butter, 1,889 tons hides, and 4,319 tons lumber. The three Vanderbilt lines carried 36.0 per cent., the two Pennsylvania lines 27.1 per cent. Lake lines carried 47,670 tons, against 49,725 tons last week.